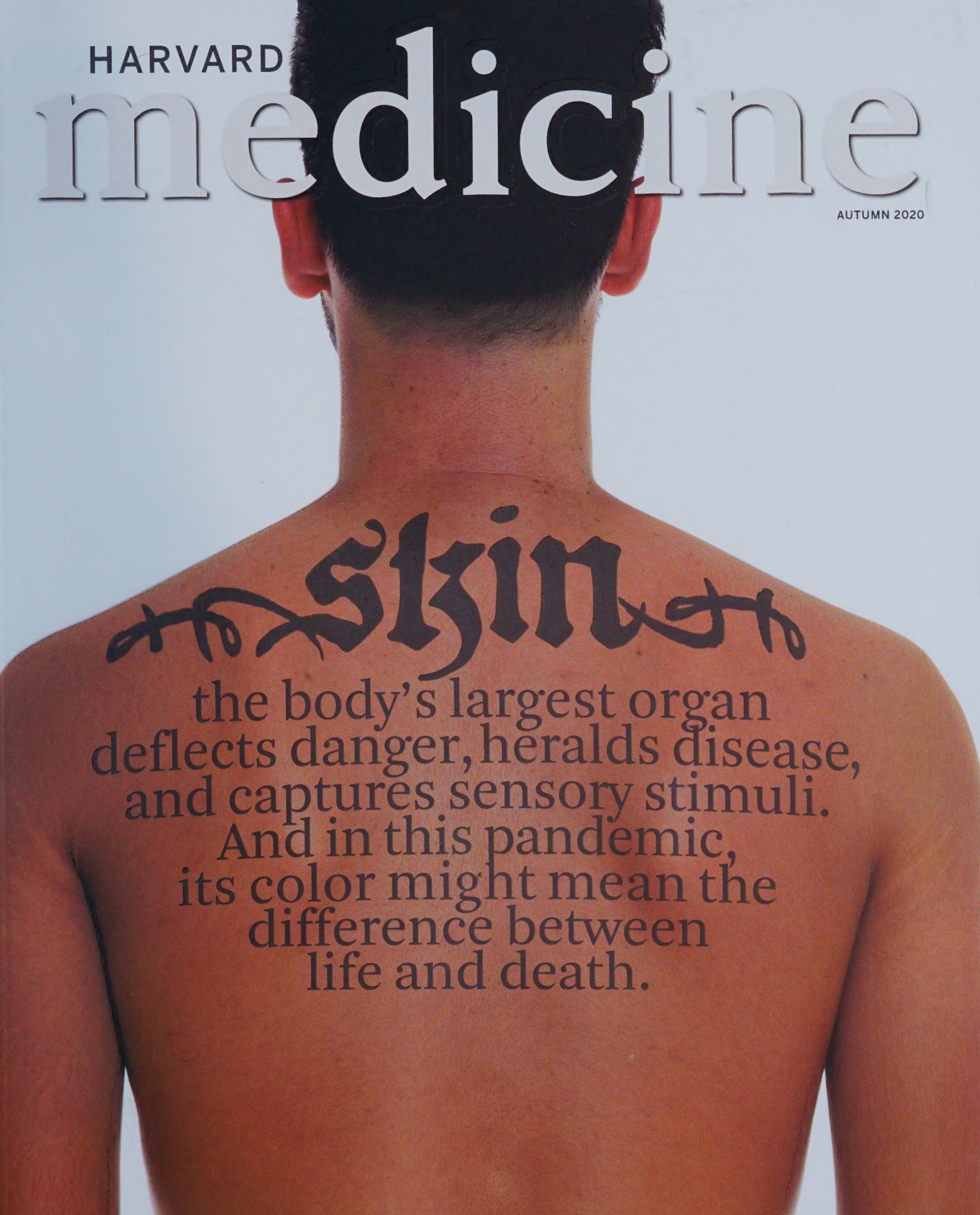
HARVARD medicine

AUTUMN 2020



Skin

the body's largest organ deflects danger, heralds disease, and captures sensory stimuli. And in this pandemic, its color might mean the difference between life and death.



a sense of place

In about six locations in the Longwood Medical Area, sturdy bikes stand ready. Available through the aptly named BLUEbikes public bike share system, these person-powered options offer a cheap, alternative way to get around campus—or around the greater metropolitan area. Jointly owned by the cities of Boston, Brookline, Cambridge, Everett, and Somerville, the system has more than 300 stations, including this one across from Vanderbilt Hall. The few ready-set-go instructions include one riders appear to take to heart: adjust the seat pole to your height.



JOHN SOARES



p. 48

THE POWER OF COMMITMENT: While still in high school, Tiara Lacey, an HMS graduate student, developed a game plan for her academic goals. Now, she's using dedication and hard work to get there.

contents

Autumn 2020 | Volume 93 | Number 3

SPECIAL REPORT
SKIN

12 Attuned to the Signs of Trouble
by Elizabeth Gehrman

Dermatologists specialize in diseases of the skin, but can also find clues to diabetes, cancer—and even COVID-19.

18 The Beauty of Touch

A photo essay of the neurobiology of skin.

22 Sun, Skin, and Science
by Stephanie Dutchen

Many hands work to shift the story of melanoma.

28 Direct Approach
by Jessica Cerretani

Harvard center aims to accelerate human skin disease research worldwide.

30 Tailored for Perfection
by Jake Miller

The self-doubts that many high-achieving people develop when facing the demands of academics or a profession can be crippling.

FEATURE

36 Who'll Stop the Rain?
by Elizabeth Gehrman

The outsized toll COVID-19 has taken on people of color reflects the insidious effects of structural inequity.

DEPARTMENTS

4 Commentaries
Letters from the dean and our readers

6 Discovery
Research at Harvard Medical School

11 Noteworthy
News from Harvard Medical School

35 BackStory
by Dominic Hall

An 1887 book on skin diseases helps establish the field of dermatology in the United States

42 Five Questions
by Ekaterina Pesheva

Sloan Devlin on sailing, chemistry, and the wonder of the human microbiome

47 Roots
by Susan Karcz

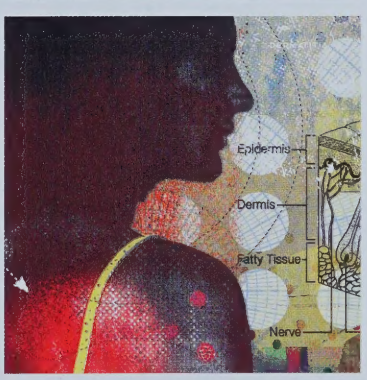
Adewole Adamson on removing bias from algorithms used to diagnose skin diseases

48 Student Life
Three PhD candidates on their research and their lifelong love of science

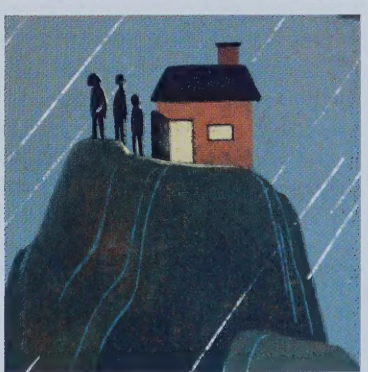
51 Rounds
Alumni recall the sports that were part of their lives while in medical school



p. 12



p. 22



p. 36

COVER: MATTIAS PALUDI; JOHN SOARES

The best care for all patients



THERE'S A PALPABLE SENSE OF EXCITEMENT among those who teach our students dermatology these days. For the past several years, the program has been acting intentionally, expanding the exposure our students have to caring for patients of color, those who are vulnerable, and those who lack access to care.

One of our instructors, Sotonye Imadojemu, knows this firsthand. "I went to medical school in Philadelphia," says Imadojemu, who helps direct our Immunity in Defense and Disease course for first-year students, "so I got to work with a diverse patient population. But here, I'm so impressed by how we continually expand the patient populations our students get to work with. As a Black woman in dermatology, I know how important it is to address disparities of care."

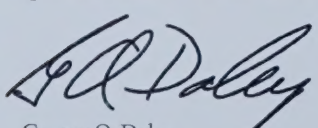
This issue of *Harvard Medicine* focuses on skin. In many respects, skin defines who we are to the world—and who we are to ourselves. As we present how dermatology ramifies throughout clinical medicine and biomedical research, we also celebrate how dermatology has mobilized to serve all populations. At HMS, this means preparing our graduates for treating skin conditions across a range of skin tones—and for ensuring that diverse populations have access to the benefits of this specialty.

I was reminded recently of the power and possibility of this during our Dean's Community Service Awards program. Among the recipients was Arianne Shadi Kourosh, an HMS assistant professor and director of community health in the Department of Dermatology at Massachusetts General Hospital. She was recognized for founding Project Phoenix, a pro bono tattoo removal program at Mass General that helps individuals who have been branded by human traffickers or by gang leaders. Kourosh and her colleagues erase the visible and painful signs of their patients' pasts, allowing them to reclaim their lives and re-present themselves to the world.

Project Phoenix is not alone in bringing dermatology to the people. For more than 50 years, trainees in each of the six hospitals that are part of the Harvard Combined Dermatology Residency Program have developed world-class skills in the specialty while also delivering on the program's mission to provide socially responsible, compassionate care to diverse populations. And increasingly, Harvard trainees participate in skin-of-color clinics and community health clinical efforts based at our affiliate hospitals and other institutions. From the Multicultural Dermatology Program at Brigham and Women's Hospital, co-directed by Jennifer Lin, MD '02, to the Multi-Ethnic Skin and Pigmentary Disorders Program at Mass General, co-led by Kourosh and Sandy Tsao, MD '93, to the Boston Healthcare for the Homeless Program, run by James O'Connell, MD '82, these clinics underscore the dedication of HMS faculty to ensuring that trainees, and the medical students who do their clinical rotations with them, are well-prepared to diagnose and treat skin conditions in all patients.

Although our work in meeting all our patients' medical needs is far from finished, I am encouraged by the considerable efforts of our faculty to ensure that dermatology at HMS prepares our students and trainees to be compassionate, skilled practitioners.

I would like to add a note about the timing of our Autumn issue. Although it was planned nearly a year ago—and almost out the door six months ago—like so many things, it was halted by the pandemic. Now, amid important dialogues about and demands for racial justice, its theme bears added weight. The issue of racism and medicine demands our specific attention and action: We plan to cover it in our Winter edition.



George Q. Daley
Dean of Harvard Medical School

HARVARD medicine

Editor
Ann Marie Menting

Design Director
Paul DiMattia

Associate Editor
Susan Karcz

Designer
Maya Rucinski-Szwec

Contributors
Jessica Cerretani; Stephanie Dutchen; Elizabeth Gehrman; Dominic Hall; Jake Miller; Ekaterina Pesheva

Editorial Board
JudyAnn Bigby, MD '78; Emery Brown, MD '87 PhD '88; Rafael Campo, MD '92; Elissa Ely, MD '87; Timothy G. Ferris, MD '92; Alice Flaherty, MD '94; Atul Gawande, MD '94; Donald Ingber, PhD; Sachin H. Jain, MD '08; Perri Klass, MD '86; Jeffrey Macklis, MD '84; Victoria McEvoy, MD '75; Barbara McNeil, MD '66 PhD '72; Lee Nadler, MD '73; James J. O'Connell, MD '82; Nancy E. Oriol, MD '79; Anthony S. Patton, MD '58; Mitchell T. Rabkin, MD '55; Eleanor Shore, MD '55

Dean of Harvard Medical School
George Q. Daley, MD '91

Executive Dean for Administration
Lisa Muto

Interim Chief Communications Officer
Laura DeCoste

Director of Editorial Services
Maria Fleming Buckley

Harvard Medical Alumni Association
Michael Rosenblatt, MD '73, *president*
Kenneth Bridges, MD '76, *president-elect*
Tamara Callahan, MD '95, *vice president*
Oni Blackstock, MD '05; Douglas Chin, MD '94; Joanna Choi, MD '09; David Cohen, MD '86; Carmen Davis, MD '90; Elizabeth Garner, MD '94; Ted Kohler, MD '76; Margaret Liu, MD '81; Allison McDonough, MD '97; Numa Pompilio Perez Jr., MD '15; Coleen Sabatini, MD '04; Alfred Sommer, MD '67; Nina Tolkoff-Rubin, MD '68

Chair of Alumni Relations
A. W. Karchmer, MD '64

Harvard Medicine is published three times a year at 25 Shattuck Street, Boston, MA 02115.

PUBLISHERS: Harvard Medical Alumni Association and Harvard Medical School
© The President and Fellows of Harvard College

PHONE: 617-432-7878
EMAIL: harvardmedicine@hms.harvard.edu
MAIL: 107 Ave. Louis Pasteur, Boston, MA 02115
WEB: hms.harvard.edu/magazine
ISSN 2152-9957 | Printed in the U.S.A.

Time machine

I appreciated the Class Day comments by **Robert Satcher Jr.,** MD '94. He reminded his audience that there remain "underlying deficiencies in our society" and "collective denials rooted in historical and institutionalized injustices." His message may sound painfully familiar to my generation of HMS alumni.

As a speaker during Class Day ceremonies in 1968, I called for incorporating community health activities into the School's curriculum. Addressing my fellow graduates 52 years ago, I lamented the School's inability to educate me beyond the "archaic patterns which still permeate our society as a whole." The lessons I said I needed "occurred under the tutelage of Mississippi sharecroppers and radical community organizers."

At that time, I concluded that the medical school was probably unable to fulfill its educational obligations to the surrounding society. For many of us, I said, it would be necessary to depend on outside groups for guidance "across the chasm which now separates the conventional professional from the vital community."

If the collective denials are still with us, how should health workers today find their way across the chasm?

HENRY KAHN, MD '68
ATLANTA, GEORGIA

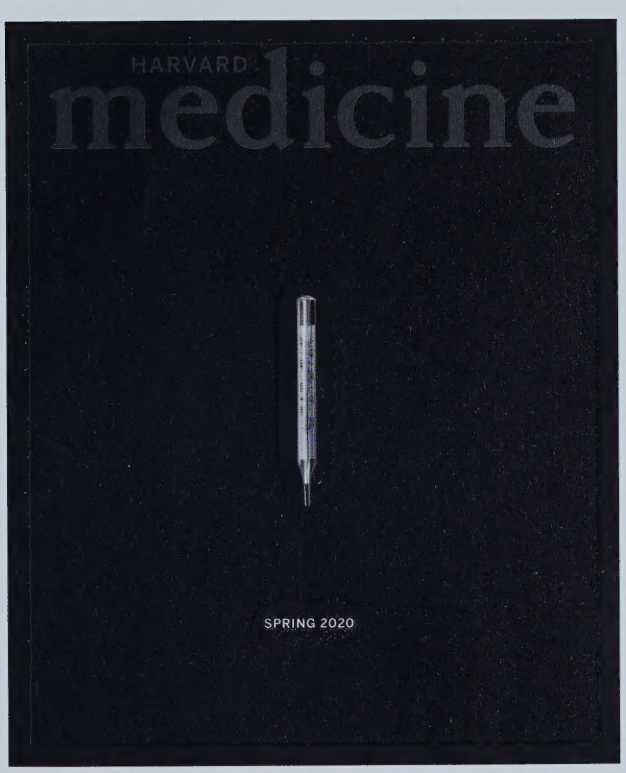
Ed: Thank you for your letter, Dr. Kahn. A search of our archives yielded a copy of your 1968 speech. We're adding it to the online version of this issue.

Warp and weft

I had worried that our fortieth reunion would not be as special as the in-person one we had all been anticipating.

I shouldn't have.

I stayed until the end, literally the end. I hesitated to hit the final "end meeting," and as I paused, I took a screenshot with my dear husband, Ron, and then one with me alone. I didn't want to end it. It felt so close. So intimate. And so real.



Our "after chat" was varied in topic, everything from art to weaving to politics.

Mark Eisenberg pushed us a bit to talk about what we are doing about pervasive structural racism and violence. He's always been the class "conscience." We searched for some actions to take, partnerships to make, and ways to turn activism into community advocacy for Black Lives Matter. We acknowledged that our children may be the ones who are able to make the next meaningful change. And we realized that we need to join them and learn from them but also that we have something to share about getting through this. The Vietnam War seems so far away now. But images from that conflict were an everyday part of our lives.

I took down my crimson and gold streamers but left up the crimson ball. I also left up the black backdrop for my Zoom calls, not in despair but in support of BLM and the ongoing commitment to diversity, equity, and inclusion shared by our graduating class.

Then, with Ron's help, I scheduled a Zoom meeting for the following morning, after the dean's talk. I was happy to hear classmates' voices again and to laugh and remember and rekindle and refocus the activism that lies within all of us.

We have all certainly stayed curious. As I wrote in my reunion report, my dad always said that the secret to longevity is to get a good education, marry well, and stay curious.

I hope we save the feeling we shared from our reunion and pledge to do it again, next time in person.

CHRISTINE LOOCK, MD '81 (Reunion Class '80)
NORTH VANCOUVER, BRITISH COLUMBIA

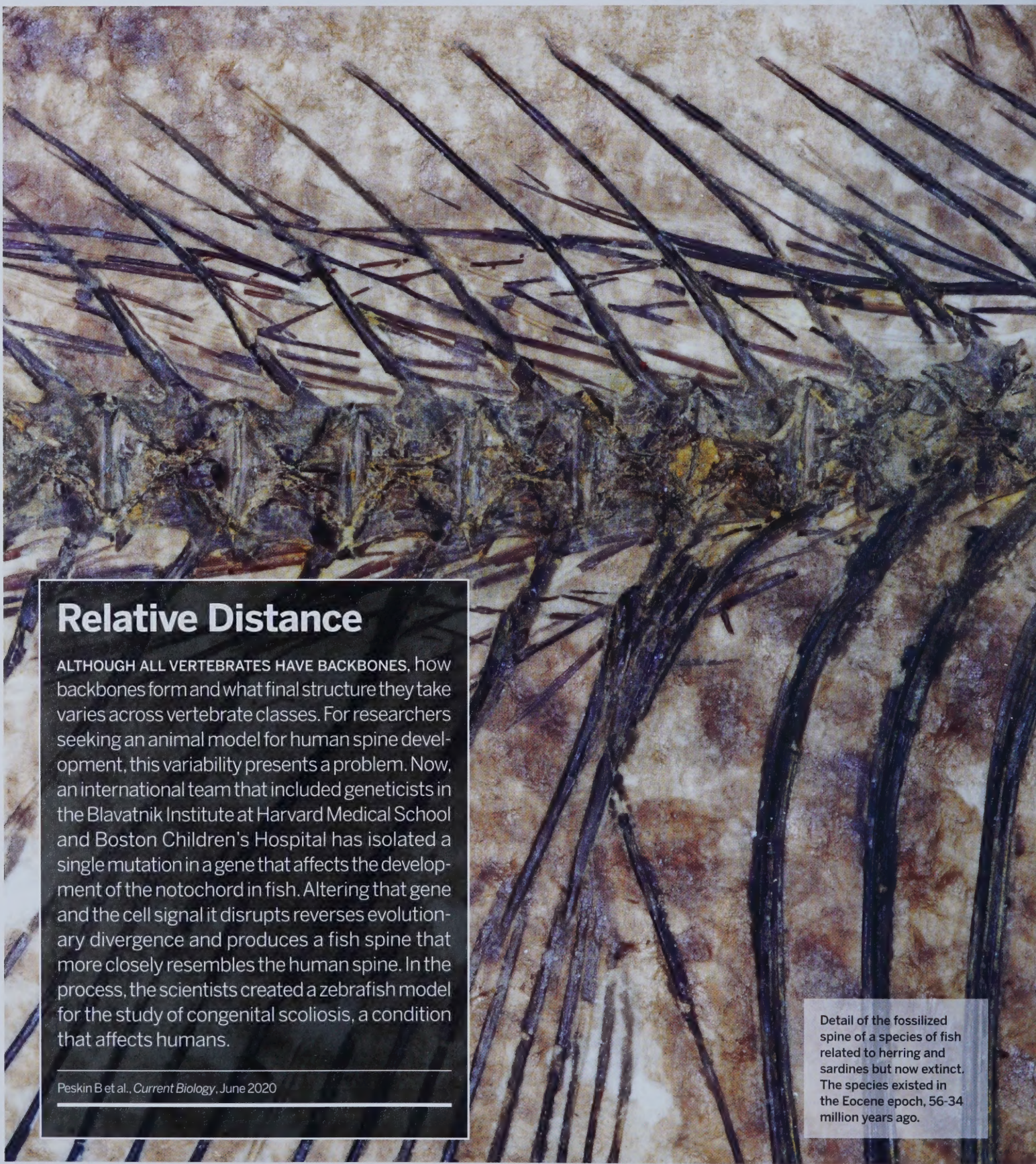
Virtual village

A virtual twenty-fifth reunion was not what our class anticipated or what we had planned as co-chairs, but through the hard work and ingenuity of the Office of Alumni Affairs and our reunion committee, our reunion was meaningful and memorable. The virtual format allowed classmates to join from around the country and across the globe, including one who Zoomed in from his overnight ED shift in New Zealand!

Our mini symposium, "Yesterday, Today, and Tomorrow," proved to be thought-provoking. A reflection from **Rodney Taylor**, one of only two Black men in our class, on his experiences at HMS and in his career, opened the door to a discussion of a very difficult topic.

Since the reunion, there has been a renewed sense of community among our classmates. We are even more excited for an in-person event next time.

EMILY OKEN, MD '96 (Reunion Class '95)
BOSTON, MASSACHUSETTS
CHASITY JENNINGS-NUNEZ, MD '95
LOS ANGELES, CALIFORNIA



Relative Distance

ALTHOUGH ALL VERTEBRATES HAVE BACKBONES, how backbones form and what final structure they take varies across vertebrate classes. For researchers seeking an animal model for human spine development, this variability presents a problem. Now, an international team that included geneticists in the Blavatnik Institute at Harvard Medical School and Boston Children's Hospital has isolated a single mutation in a gene that affects the development of the notochord in fish. Altering that gene and the cell signal it disrupts reverses evolutionary divergence and produces a fish spine that more closely resembles the human spine. In the process, the scientists created a zebrafish model for the study of congenital scoliosis, a condition that affects humans.

Peskin B et al., *Current Biology*, June 2020

Detail of the fossilized spine of a species of fish related to herring and sardines but now extinct. The species existed in the Eocene epoch, 56-34 million years ago.

MATERNAL HEALTH

Pregnancy and type 1 diabetes trends described

A STUDY OF PREGNANCY-RELATED OUTCOMES for U.S. women with type 1 diabetes conducted by HMS researchers at Joslin Diabetes Center found that during a recent 13-year period the percentage of mothers with excess weight gain during pregnancy increased by 10 percent, A1c levels remained steady, and the prevalence of nephropathy fell from 4.8 percent to zero. In addition, analysis of the data showed that during the period studied, the use of insulin pumps increased by about 23 percent while the use of continuous glucose monitoring went from zero in the first years to nearly 40 percent during the last years of the study.

The research team began its investigation to understand why women with type 1 diabetes have large birth-weight babies and to determine whether the prevalence of babies born very large had changed over the years. To suss out this relationship, the investigators also needed to understand the influence that a broad number of variables, such as treatment, delivery, and neonatal health, as well as the mothers' glucose levels, gestational weight gain, and other maternal factors, have on pregnancy outcomes.

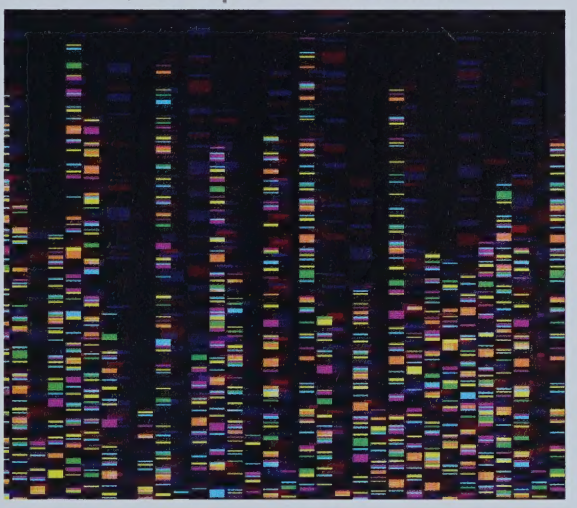
The researchers drew their data from medical records of 700 pregnant women with type 1 diabetes who attended the Joslin Diabetes Center and Beth Israel Deaconess Medical Center Diabetes in Pregnancy Program between 2004 and 2017.

In addition to describing trends in pregnancy-related outcomes for women with type 1 diabetes, the study showed that length of pregnancy increased slightly over time and that the prevalence of babies born very large remained high throughout the study period. The latter finding is concerning because large babies are at greater risk for metabolic diseases in later life.

Helman S et al., *Journal of Perinatology*, June 2020

Genetics

Genes behind sex biases in autoimmune disorders, schizophrenia identified



The autoimmune conditions lupus and Sjögren's syndrome affect nine times more women than men, while schizophrenia affects more men than women. Now, a research collaboration led by scientists in the Blavatnik Institute at Harvard Medical School has shown that this sex bias is associated with the relative abundance of the immune-related protein complement component 4, which is produced by the *C4* gene. Compared with people with the fewest *C4* genes, individuals who had the most *C4* genes were seven times less likely to develop lupus, 16 times less likely to develop Sjögren's syndrome, and 1.6 times more likely to develop schizophrenia. Even in people with similar complement gene profiles, the genes produced more protein in men than in women.

Kamitaki N et al., *Nature*, May 2020

NEUROBIOLOGY

Insight gained on neural processing of odors

BY DELIVERING ODORS with carefully selected molecular structures to awake mice and then analyzing the animals' neural activity, researchers in the Department of Neurobiology in the Blavatnik Institute at HMS have described for the first time how the olfactory cortex, the region of the brain responsible for processing smell, encodes information about odor chemistry, the fundamental sensory cues of olfaction.

The research team showed that neuronal representations of smell in the cortex reflect chemical similarities between odors, thus enabling scents to be placed into categories by the brain. Moreover, these representations can be rewired by sensory experiences.

The findings suggest a neurobiological mechanism that may explain why individuals have common but highly personalized experiences with smell. In addition, the results could open new avenues of study to better understand how the brain transforms information about odor chemistry into the perception of smell.

Pashkovski SL et al., *Nature*, July 2020

NEUROBIOLOGY

Clues to face blindness uncovered

THE ABILITY TO RECOGNIZE FACES is a complex neurocognitive skill with important social implications. A disorder that impairs that ability can lead to isolation and anxiety and harm personal and work relationships.

The traditional view of face blindness disorder, or prosopagnosia, holds that it arises from deficits in visual perception. Researchers at HMS and VA Boston Healthcare System have now shown that this explanation may be too simple and that successful facial recognition requires recollection of relevant contextual details about a person, such as their name or profession.

The findings help explain a discrepancy in face blindness research: People with the condition often fail to visually identify familiar faces, but many also perform normally on visual-perception tests. This research could also help inform the design of techniques to boost face recognition in people with developmental prosopagnosia—a form of face blindness that is not caused by brain injury, poor vision, or neurodevelopmental disorders such as autism.

The ability to recognize a face requires two forms of memory: recollection and familiarity. Recollection is the retrieval of contextual information upon seeing a face, while familiarity is a fuzzier "feeling of knowing" without any contextual information, the researchers say.

To tease out the differences in recognition memory between participants with lifelong face blindness and those without the disorder, the scientists measured participants' degree

of confidence in classifying each face as "old" or "new." In these tests, correctly identifying a face as old with high confidence reflected the use of recollection, whereas correctly identifying a face as old with less confidence reflected the use of familiarity.

Compared with participants who had face blindness, people without it were significantly more confident that they had seen the faces before; they relied on recollection. Those with face blindness, however, were able to correctly identify many of the faces they had seen before but did so with less confidence; they relied on familiarity.

The results, the researchers say, demonstrate that successful face recognition requires more than a vague familiarity with a face: it requires the recollection of context. Furthermore, they say the findings suggest that people with developmental prosopagnosia use a different memory system when trying to learn and remember faces, a system less suited for the task of face recognition.

Stumps A et al., *Cortex*, July 2020

GERONTOLOGY

Statins may decrease risk of death for older adults

IN A RETROSPECTIVE ANALYSIS OF DATA from nearly 60,000 veterans who had been prescribed statins, HMS investigators at Brigham and Women's Hospital and VA Boston Healthcare System found that the use of the drugs by veterans who were over the age of 75 but had not experienced a heart attack, stroke, or other cardiovascular event lowered the risk of dying from any cause by 25 percent compared with peers who had not been treated with statins. The risk of death from a cardiovascular event, such as a heart attack or stroke, was 20 percent lower in the group taking statins. The findings reflect participant outcomes during a mean follow-up period of nearly 7 years.

In addition, the researchers found that veterans who were older than 90, including patients with conditions such as dementia, also had lower mortality rates. In secondary analyses, the team found that starting a statin was also significantly associated with a lower risk of a cardiovascular event such as heart attack and stroke. Of particular note, they add, was a marked decline in rate of strokes among the study's Black participants.

The researchers suggest that these findings indicate that a patient's age should not deter a physician from prescribing statins.

Orkaby AR et al., *JAMA*, July 2020

CLINICAL MEDICINE

Severity of COVID-19 is not linked to blood type

BLOOD TYPE IS NOT ASSOCIATED with a severe worsening of symptoms in people who have tested positive for COVID-19, according to HMS researchers at Massachusetts General Hospital. Although the findings dispel previous reports suggesting that a certain ABO blood type could lead to increased disease severity, they did indicate that symptomatic individuals with blood types B and AB who are Rh+ are more likely to test positive for COVID-19 than people with other blood types. Symptomatic people with blood type O are less likely to test positive.

The COVID-19 pandemic has spurred research to find characteristics that render individuals more susceptible to the virus, as well as risk factors that intensify its severity and progression. Some have suggested there may be a link between the disease and blood type.

The researchers drew upon the Mass General Brigham Research Patient Data Registry to assemble a study population of 1,289 symptomatic adult patients whose blood type had been recorded and who had tested positive for COVID-19.

The retrospective review showed no significant connection between blood type and worsening of the disease or blood type and the need for hospitalization, positioning requirements for patients during intubation, or any inflammatory markers.

The findings, say the researchers, need to be further explored to determine whether there is something inherent in blood types B, AB, and O that potentially induces risk or confers protection in individuals.

Latz CA et al., *Annals of Hematology*, July 2020

PEDIATRICS

A COVID-19 syndrome in children gains detail

RESEARCHERS AT HMS and Boston Children's Hospital and scientists at other institutions are exploring how children and young people respond to infection by SARS-CoV-2.

A recent report from the team looked at those children who developed multisystem inflammatory syndrome in children, or MIS-C, as a result of their infection. They found cardiovascular complications in 80 percent of these patients. Within that group, 8 percent had involvement of the coronary arteries, which can lead to deadly aneurysms. These findings led the researchers to recommend serial echocardiograms to monitor the heart and coronary arteries of patients with MIS-C.

The researchers also found inflammation and fever were defining features of MIS-C. All patients had fever, lasting a median of six days, and 92 percent had four or more biomarkers indicating inflammation. Seventy-one percent of patients had involvement of four or more organ systems.

In addition, the investigators' analysis found 76 percent of the patients had blood abnormalities, with 47 percent receiving treatment to prevent clots. Involvement of the mucous membranes and skin was seen in 74 percent. Seventy percent had respiratory symptoms, with 20 percent requiring mechanical ventilation and another 17 percent receiving noninvasive ventilation.

Feldstein LR et al., *New England Journal of Medicine*, July 2020

*HM INDEX: IN 2012-2013, NEARLY **28** PERCENT OF U.S. ADULTS 40 YEARS OF AGE AND OLDER USED STATINS, UP FROM NEARLY **18** PERCENT IN 2002-2003.*



Hearing Aid

COCHLEAR SYNAPTOPATHY, an irreversible form of sensorineural hearing loss in humans, occurs when noise exposure or aging cause the nerves in the inner ear to lose synaptic connections to one another. In studies that used a mouse model, however, HMS researchers at Massachusetts Eye and Ear have found a clue to repairing those connections and reversing this form of hearing loss. The researchers demonstrated that bisphosphonates, medications often used to prevent bone loss, can regrow damaged nerve connections in the inner ear of mice with sensorineural hearing loss. The researchers hope this pilot study will lead to clinical trials in humans within the next several years.

Seist R, Tong M et al., *Frontiers in Molecular Neuroscience*, July 2020

This light micrograph of the inner ear of a newborn mouse shows the cochlea, the hearing organ that contains hair cells. Bundles of hair-like projections (green) sit atop these cells and move in response to sound waves. The movement triggers the hair cells to send electrical signals to the brain for processing. Cells that support the hair cells are shown in red and purple.



Taxi Service

LEVERAGING THE ABILITY OF RED BLOOD CELLS to capture, neutralize, and transport pathogens to immune cells in the spleen and liver, a team of researchers from Harvard's Wyss Institute for Biologically Inspired Engineering and John A. Paulson School of Engineering and Applied Sciences devised a platform technology that uses the cells to initiate an immune response that slows tumor growth in mice with cancer. The team says the technology could offer a biocompatible adjuvant for vaccine development.

Ukidve A, Zhao Z et al., *PNAS*, July 2020

noteworthy

Alumna set to lead key student, multicultural offices

On July 1, Andrea Reid, MD '88, began two new roles at HMS: associate dean for student and multicultural affairs in the Program in Medical Education and director of the Office of Recruitment and Multicultural Affairs (ORMA). Reid will also rejoin the Department of Medicine and the GI Unit at Massachusetts General Hospital, where she will serve as director of diversity and faculty development for the hospital's Division of Gastroenterology.

As the ORMA director, Reid (*fig. 1*) will focus on the recruitment and support of medical students from groups who are historically underrepresented in medicine, who identify as LGBTQ, and who are economically disadvantaged.

Reid leaves a position at the VA Medical Center in Washington, DC, where she has served as a gastroenterologist and hepatologist since 2009. Commenting on her return to HMS, Reid says, "It is a full-circle time for me as I take the helm of the Office of Recruitment and Multicultural Affairs, a place where I obtained valuable support as a student and educator. I am eager to be an advocate, mentor, advisor, and facilitator for diverse students at HMS and to work with other educators at HMS to ensure a medical education that is equitable, inclusive, bold, and progressive."

Reid trained in internal medicine and gastroenterology at Mass General. After completing her GI clinical and research fellowship, she joined the HMS faculty and the Mass General Department of Medicine. During her tenure, Reid co-chaired the Internship Selection Committee, Medical Services, directed the GI fellowship at the hospital, taught GI in the HMS curriculum, and mentored numerous medical students. She earned an MPH from the Harvard T.H. Chan School of Public Health and has received several awards for her commitment to teaching and mentorship at HMS and Mass General and in the community.

Her clinical and research interests include hepatitis C virus infection, especially in African Americans, racial disparities in liver disease and liver transplantation, nonalcoholic fatty liver disease, and medical education.

At ORMA, Reid succeeds Alvin Poussaint, who established the office and led it for 50 years, until his retirement in June 2019.

Leadership change for dental school takes place

William V. Giannobile, an educator and leader in the field of periodontology and an internationally recognized scholar in oral regenerative medicine, tissue engineering, and precision medicine, has been named dean of the Harvard School of Dental Medicine. His tenure as dean began September 1.

Giannobile (*fig. 2*) is an alumnus of HSDM, having earned an advanced degree in periodontology and oral biology in 1996. He completed his postdoctoral training in molecular biology at Dana-Farber Cancer Institute and HMS, then served as an HSDM faculty member. Early in his career, he worked at the HSDM-affiliated Forsyth Institute.

"I am thrilled to welcome Will back to Harvard School of Dental Medicine and the Longwood Medical Area," said HMS Dean George Q. Daley, MD '91. "Having roots in our community and experience as a passionate and productive leader of a major department at a premier dental school make him perfectly suited to take the helm at HSDM."

Giannobile left the University of Michigan School of Dentistry, where he was the Najjar Endowed Professor and chair of the Department of Periodontics and Oral Medicine and professor of biomedical engineering in the university's College of Engineering.

The new dean takes the helm at a time when HSDM will enroll its most diverse predoctoral class in recent history. An important focus of the dental school is to advance diversity and inclusion and encourage those underrepresented in health care to consider careers in dentistry.

Giannobile succeeds Vicki Rosen, who served as interim dean after Bruce Donoff, MD '73, stepped down at the end of 2019 after 28 years as dean. Donoff earned his DMD from Harvard in 1967.



fig. 1



fig. 2

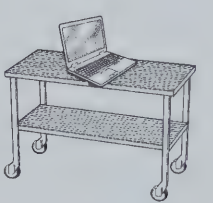


fig. 3

Pandemic spurs remote teaching of clinical skills

When the COVID-19 pandemic prompted HMS to move learning online, faculty swiftly developed new curriculum approaches for teaching remotely while ensuring that students achieved learning objectives.

But for clinical courses requiring the human touch to fully assess a patient, remote teaching (*fig. 3*) presented additional challenges.

"What is missing is the actual laying on of hands," said John Dalrymple, MD '91, associate dean for medical education quality improvement in the Program in Medical Education.

That presented an obstacle, but one that led HMS faculty to become more creative.

For instance, they converted objective structured clinical examination courses to a virtual format in which standardized patients, usually individuals trained to portray actual patients, are examined via televisits, while clinical skills faculty observe, coach, and assess students' skills.

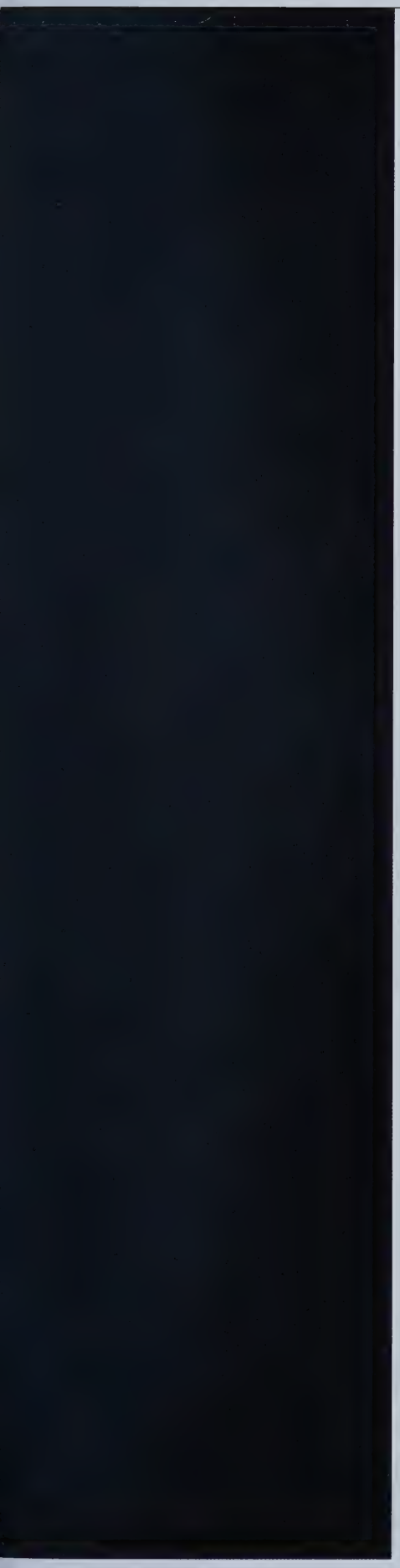
Dalrymple, together with other faculty, began creating an elective that incorporates telemedicine for students in clinic, as well as students who have already finished their principal clinical experience. Telemedicine is also being incorporated into the longitudinal primary care clerkship.

Another team designed a five-module telemedicine course that covers the basics, including what telemedicine is, what some of its ethical issues are, and how to plan and set up televisits. The team also developed demonstration videos on how to perform physical exams remotely.

Faculty who administer the radiology clerkship created a virtual radiology course that includes daily lectures, small group sessions, and curated case reviews. Other faculty developed a virtual clinical pathology course that provides teaching sessions, self-directed learning with online resources, small group sessions, and weekly reviews with faculty, fellows, and residents. Additional virtual specialty electives, such as ophthalmology and dermatology, have been developed for post-PCE students.

Dermatologists specialize in diseases of the skin, but can also find clues to diabetes, cancer—and even COVID-19





JUTI/ESSENTIALS COLLECTION/GETTY IMAGES

Attuned to the Signs of Trouble

BY ELIZABETH GEHRMAN

IT'S PROBABLY SAFE TO SAY that when people think of television doctors dramatically saving lives, they rarely envision dermatologists. But many experienced dermatologists have tales of doing just that. Arianne Shadi Kourosh, an HMS assistant professor of dermatology who serves as director of community health in the Department of Dermatology at Massachusetts General Hospital and is founding director of the hospital's Multi-Ethnic Skin and Pigmentary Disorders Program, once diagnosed a woman's endometrial cancer based on an unusual rash, and Esther Freeman, MD '09, an HMS assistant professor of dermatology and the director of Global Health Dermatology at Mass General, caught a relatively early-stage ovarian cancer by putting together a collection of subtle symptoms including muscle weakness, a purple rash on the patient's eyelids, and a slight "shawl sign," or redness around the neck. "None of these things mean much separately," Freeman says, "but together they can add up to dermatomyositis, an inflammatory autoimmune condition associated with a six-fold risk of cancer."

The language of skin

There haven't been many studies on skin complaints in primary care, but a 2001 retrospective review of patient charts published in the *Journal of the American Academy of Dermatology* found that about 36 percent of patients coming to the University of Miami's general medicine clinic over a two-year period presented with at least one skin problem, which for 60 percent of those patients was their primary complaint. And yet, say experts, dermatology gets short shrift in medical schools. Freeman recalls receiving "exactly one day" of training before her residency.

"If more than one-third of patients have a skin care complaint and in medical school you're only getting a few days of dermatological training," says Freeman, "it's a mismatch. My primary care colleagues have a hard job and have to know a lot about many different aspects of medicine, but we're not preparing our workforce for the burden of conditions they're going to see."

There are "literally thousands of internal diseases, in all specialties, that can manifest on the skin," according to Joseph Loscalzo, head of the Department of Medicine at Brigham and Women's Hospital. Even the novel coronavirus turned out to have cutaneous manifestations.

About a month into the pandemic, doctors started noticing that some patients with COVID-19 who were otherwise asymptomatic exhibited purplish or dark red inflammation on their fingers and toes similar to what occurs with chilblains. The condition came to be known as "COVID toe." It's not the only cutaneous manifestation of SARS-CoV-2 , says Freeman. Others include a measleslike rash, hives, and, on the legs, a lacy pattern of lesions akin to the reddish-blue discolorations of livedo reticularis.

Freeman started an international registry to record dermatologic manifestations of COVID-19. It now has more than one thousand cases from thirty-eight countries. Data from this registry has helped identify symptoms specific to COVID-19, which, in turn, has contributed to including skin signs in testing criteria for the disease.

Freeman has presented the findings on skin signs to teams of physicians who are caring for COVID-19 patients. Following one such presentation, Freeman says, "I received an email from an infectious disease physician telling me she had a patient present with a new rash. Based on the skin findings for COVID-19, she had the patient tested—and received a positive result."

As the body's largest organ, skin both reflects what a person is exposed to in the environment and reveals what is happening internally.

"If recognizing these signs and testing people for the disease can help avert viral transmissions," she adds, "well, that's a win."

A window within

As the body's largest organ, skin both reflects what a person is exposed to in the environment and reveals what is happening internally. Even as it modulates and mirrors the immune system through lymphocytes, mast cells, and an immune activation system called the dendritic cell network, the skin's ubiquitous blood vessels can also be a "window to internal disorders," says Loscalzo.

Tiny yet prominent bright red veins known as venules, for instance, can indicate a hereditary hemorrhagic disease called telangiectasia, which can cause gastrointestinal bleeding and abnormal tangles of blood vessels connecting arteries and veins. Inflammatory vasculitis occurs when the immune system mistakenly attacks blood vessels and can signal hepatitis, rheumatoid arthritis, or lupus. And the blood or lymphatic systems can carry metastatic cells from breast, lung, colon, and other cancers to the skin where they can appear as a form of melanoma, carcinoma erysipeloides, and other malignant ulcerations.

"People have a misconception about dermatology," says Lynn McKinley-Grant, MD '80, who is the president of the Skin of Color Society, an associate professor at Howard University College of Medicine, and former vice chair for diversity and community engagement in the Department of Dermatology at Duke University School of Medicine. "They're not aware that dermatologists work with so many complex medical patients," she notes. "My decision to become a dermatologist was based on an awareness that the skin reflects health and disease in the whole patient."

An example from her residency illustrates McKinley-Grant's point, "A thin, elderly African American man presented with weight loss, severe anemia, and trace blood in his stool. His normally darker skin type had paled to a gray brown, and he had a rock-hard cyst on his forehead. We determined he had Gardner's syndrome, a type of hereditary polyposis of the colon that is associated with bone growths, epidermal cysts, and colon cancer."

Signs and signifiers

Dermatologists don't just look at the skin, but also at hair, nails, eyes, and oral and genital mucosa to make their diagnoses. Skin can show signs of liver and kidney disease, malabsorption and nutritional deficiencies, and endocrinopathies and gastrointestinal disorders. Ridges on the nails can be read like the rings on a tree, often appearing as a side effect of chemo treatments, heart attack, or infections like mumps or coxsackievirus. The patchy loss of skin color that characterizes vitiligo can presage thyroid disease as surely as can more typical symptoms like thinning hair and brittle nails. Dermatitis herpetiformis—chronic itchy, blistered skin—affects about 10 percent of people with celiac

"I received an email from an infectious disease physician telling me she had a patient present with a new rash. Based on the skin findings for COVID-19, she had the patient tested—and received a positive result."

disease, and while flushing can be benign, as it usually is in menopausal women, for example, it may also hint at serious hormonal disorders or cardiovascular issues.

And that's one problem with diagnosing through cutaneous signs: While some indications of internal disease are unusual enough that physicians immediately refer patients to a specialist, many skin-related symptoms seem so common and mild that they don't warrant alarm. Examples include the painful, raised lesions known as Osler's nodes, Janeway lesions on the palms and soles, and reddish-brown splinter hemorrhages, which may not be seen often in general practice but are associated with endocarditis, among other conditions.

"Skin signs can be good at telling you something's going on but not necessarily at telling you what is going on," says Jeremy Beaulieu, a nurse practitioner at Joslin Diabetes Center. "Also, many skin lesions will resolve on their own without any intervention." The ambiguous and vague nature of dermatological symptoms, along with mercurial appearances and disappearances, may contribute to diabetes diagnoses often lagging behind symptoms by a decade or more. Necrobiosis lipoidica and acanthosis nigricans can be clear-cut warnings of insulin resistance, but less obvious is itchy skin, says Beaulieu. "Ninety-nine percent of the time, you're itching because the air is dry," he points out. "Health care professionals might advise patients first to try a moisturizer, but it's important to follow up if that's not working."

Acne, eczema, vitiligo, and other visible skin diseases can themselves increase the likelihood of depression.



Esther Freeman

Psoriasis, too, is a common skin condition that research conducted in the past decade has shown is associated with lung cancer and lymphoma. In women, psoriasis and psoriatic arthritis have been linked with Crohn's disease, osteoporosis, and inflammatory bowel disease.

Psoriasis can signal not only an internal illness but also can be associated with its occurrence. A 2018 literature review in *Cureus*, for instance, considered the causal relationship between psoriasis and cardiovascular disease.

"A lot of recent studies show that the chronic inflammation of psoriasis can put people at higher risk for cardiovascular disease, especially in people with comorbidities such as smoking, obesity, and diabetes," says McKinley-Grant.

Acne, eczema, vitiligo, and other visible skin diseases can themselves increase the likelihood of depression. "Doctors sometimes brush them off, but skin diseases can be really debilitating for patients," says Kourosh. "Even in cases where they're not 'dangerous,' some diseases are so marginalizing they can ruin someone's life and make them hide from society and even become suicidal."

Mind-body connections

Many patients with psychological and psychiatric disorders can show skin signs that are clues to their illnesses. This can be true for a

range of mental illnesses, including obsessive compulsive disorders, delusions of parasitosis, self-mutilation, eating disorders, phobias, depression, and bipolar disorder.

These links have embryologic roots, McKinley-Grant points out. As human embryos develop, the neurons of the brain, the pigment cells of the skin, and the epidermis, or outer layer of skin, all derive from the layer of embryonic cells known as the ectoderm. Understanding this relationship highlights the importance of distinguishing the fundamental cause of a skin finding, she says, and underscores how vital it is to really look at a patient.

"Doctors spend less time observing live patients, and they spend more time looking at the e-patient in an electronic medical record on the computer," says McKinley-Grant.

Freeman notes that some skin manifestations of disease simply aren't on physicians' radar. Patients with AIDS, for instance, overwhelmingly report cutaneous symptoms, but those symptoms are not always as obvious as one might think. "Even in Africa," she says, "where doctors are dealing with more cases of HIV and AIDS and routinely seeing Kaposi's sarcoma, it can be hard to diagnose without access to skin biopsies. It turns out that when we use clinical judgment alone, we are wrong about a third of the time. There are a lot of KS mimickers."

Similarly, in this country, dermatologists are "having to reeducate our colleagues on the cutaneous signs of measles, mumps, and other reemerging diseases in this era of nonvaccinators," says Kourosh. "An aggressive form of hand, foot, and mouth disease made a terrible recurrence a few years ago."

Text revisions

A further complication to correct diagnosis is that many medical textbooks and online guides have not always included darker skin tones in their photographs and descriptions. "We're still far from reaching parity," says Kourosh. "Unless a person happened to train in a hospital system that's extremely diverse, it's very hit or miss whether they'll be trained on all skin colors." This is especially important because there are disorders that disproportionately affect people with dark skin.

Although the problem is slowly being addressed, McKinley-Grant says it is crucial that health care providers are trained in recognizing diseases—and subtle changes—in all skin types.

Medical textbooks and online guides have not always included darker skin tones in their photographs and descriptions.

"Almost every mother, regardless of the ethnicity or age of her child, can tell when they are pale and not feeling well," she says. "The underlying hues of the skin are not only the result of the presence of melanin, but also reflect red blood cell counts and oxygen levels—measures that are vital signs for all humans. We need to train our health care providers to recognize changes in hue in all skin types, including the skin of Black and brown people."

"When we invite people for lectures or to contribute to a textbook or health care literature," she adds, "we need to start making it almost mandatory that they show a diversity of ethnicity and skin color in the presentation, with images of disease in black and brown skin."

Rashes that may look red on a light-skinned patient tend to appear darker


Lynn McKinley-Grant

brown or purple on brown or black skin. Anemia appears as gray on dark skin rather than ghostly pale on light skin, while the darkening of skin associated with hyperpigmentation, itself a sign of Addison's disease and other conditions, may go unnoticed on dark skin. For inflammation, says McKinley-Grant, it's important to ask the patient where the warmth and pain is and whether the area in question looks like their normal skin color.

Dermatologists also discern problems in people with darker skin tones by looking for patterns. "Pattern recognition is a huge part of our training," says Freeman. "We get 12,000 to 16,000 hours of supervised patient care. That allows us to learn to recognize patterns. So if you see a pattern but don't know how to interpret it, call a dermatologist."

Future vision

That may be easier said than done these days. Since 1999, American Academy of Dermatology surveys have steadily shown that skin doctors themselves report there are not enough of them to go around, especially with the increasing demands on the profession as a result of population aging and rising rates of skin cancer and other cutaneous diseases.

Dermatology is one of the highest paying fields of medicine, and it has one of the lowest burnout rates. The ever-increasing market for cosmetic dermatology—which is paid for out-of-pocket—has put an even greater burden on residency programs. "At Harvard, 70 percent of our residents stay in medical or academic dermatology," says Freeman, "but we're probably the only school in the country with that statistic. Not everyone who wants to is able to match into the field, and these are really good students. It's common to take a year off from medical school and do a year of dermatological research just to get in."

Many schools are combining residencies in internal medicine and dermatology. "Dermatologists look at a rash and then develop a differential diagnosis, then ultimately get a history," says Loscalzo. "Internists do just the opposite, gathering a lot of history, looking at all aspects of the patient's physical exam, and then trying to correlate what's going on with the skin to what's happening internally. It's a totally different heuristic, and a combined residency is a great way to learn both worlds."

Continuing medical education, workshops, and events like Mass General's annual Dermatology Bootcamp, hosted by Kourosh, are helping to bridge the gap. "Through programs like this, dermatologists at HMS are always more than ready to teach and give lectures to other providers and trainees in our hospital system and the community," Kourosh says.

In addition, the use of telehealth has helped extend expertise. Although its use increased 53 percent between 2016 and 2017, according to a 2019 article from the American Medical Association, its use has expanded again. Earlier this year, the AMA detailed extensive changes to telehealth, all allowed for in the Coronavirus Aid, Relief, and Economic Security Act of 2020. Among those changes: expanding the list of services that can be delivered remotely, ensuring payment of physician fees for those services, and updating the requirements for accessing remote care to permit physicians to conduct telehealth visits from their homes—and patients to access them from theirs.

The ever-increasing market for cosmetic dermatology has put an even greater burden on residency programs.

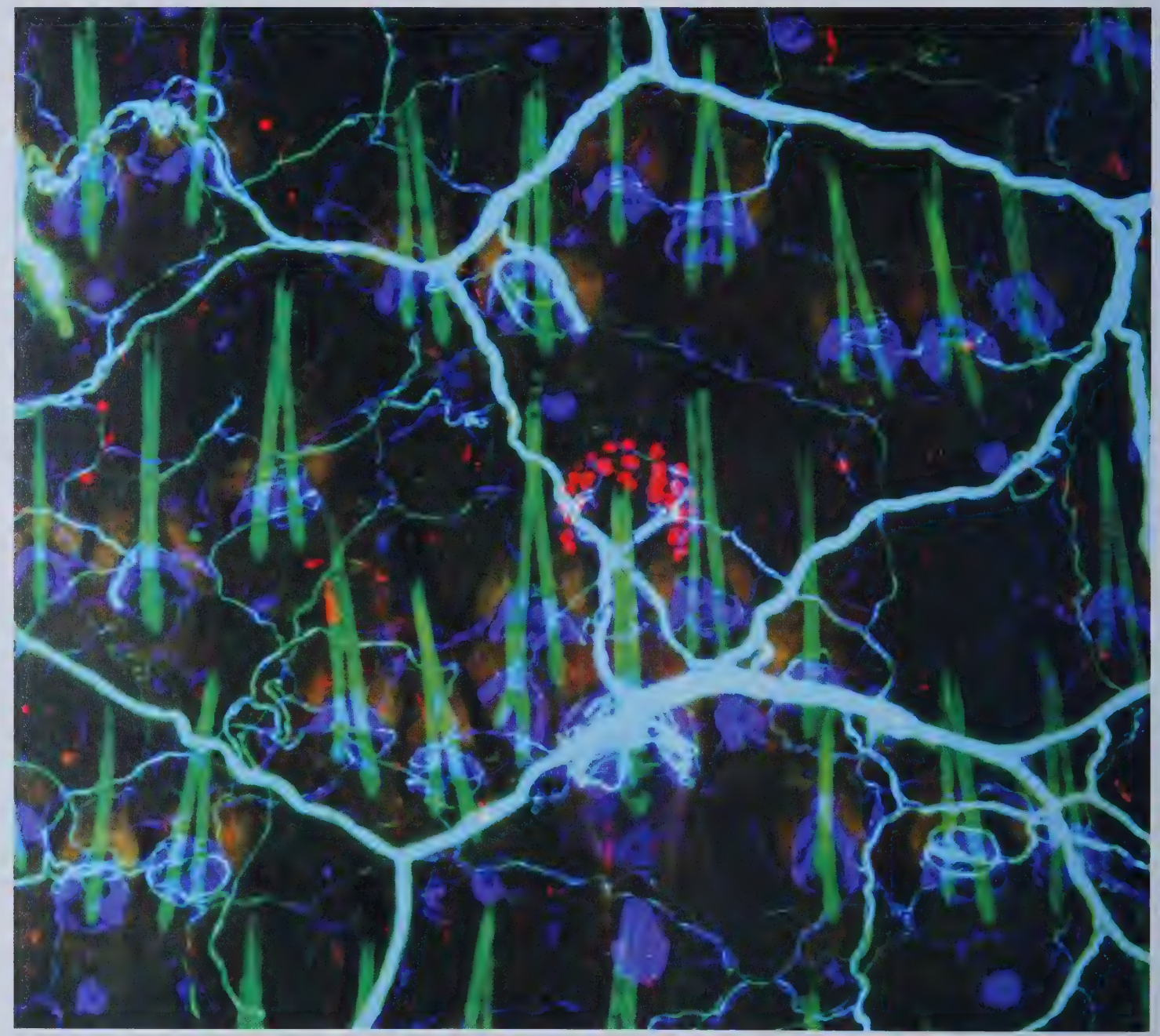
These changes have been especially useful for dermatology and are increasing access to health care in all specialties, particularly for underserved patients in rural areas and elsewhere, for members of the military, and, during this pandemic, for patients sheltering in place, says McKinley-Grant.

Apps and artificial intelligence also hold promise, though, according to Kourosh and others they have a long way to go. "To train AI at high levels of accuracy," Kourosh says, "you need an enormous collection of photos, and even the largest dermatology photo libraries don't have standardized diagnoses where a group of dermatologists agree." Add to that the dearth of patients of color represented in most collections. "Multiple efforts are being made now to do this correctly and safely for patients, but it may take years," she adds.

Until then, internists, primary care doctors, and other specialists remain patients' first line of defense. "It's true that time is a bigger limitation than in the past," admits Loscalzo, "but if you're not carefully considering skin symptoms, you're not being a thorough physician." HM

Elizabeth Gehrman is a Boston-based writer.

"A lot of recent studies show that the chronic inflammation of psoriasis can put people at higher risk for cardiovascular disease, especially in people with comorbidities such as smoking, obesity, and diabetes."





The blue-green processes of sensory neurons in the above photo form a network of nerve endings in mouse skin. Some of these endings associate with touch-sensitive skin cells (shown in red). The green tent-like structures represent hair shafts.

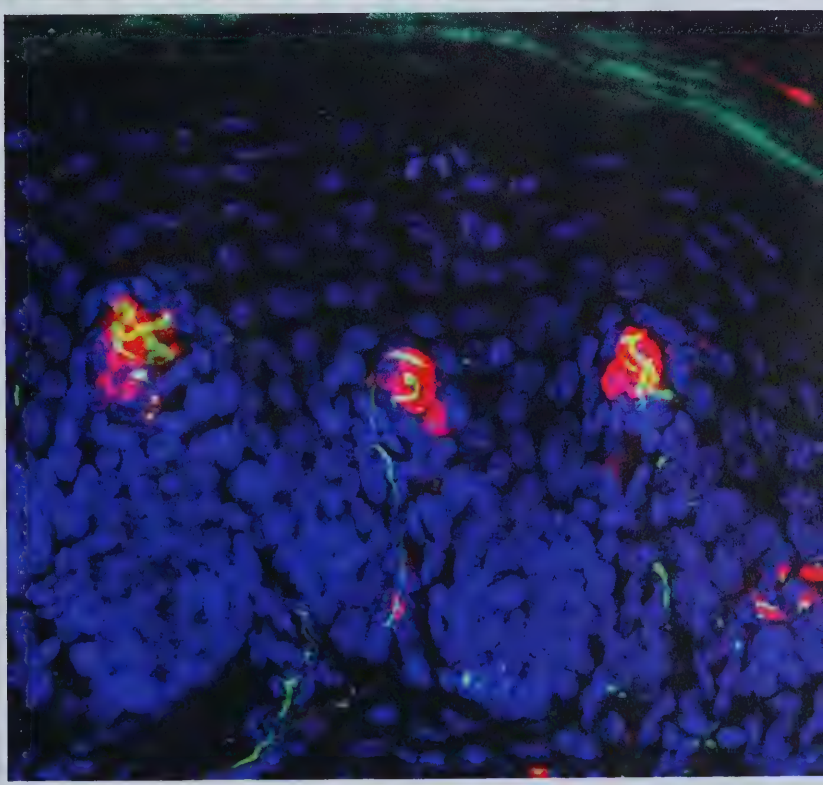
The red, green, and yellow colors in this photo (right) reveal the intermingled endings of three sensory neurons found around a mouse hair follicle. This type of neuronal ending, called a lanceolate ending, responds to minute deflections of hair by sending electrical signals to the spinal cord, alerting the animal to the movement. Lanceolate endings associated with hair follicles have been observed in all mammals studied thus far.

The Beauty of Touch

The neurobiology behind our sense of touch is fascinating and complicated. It also can be visually stunning.

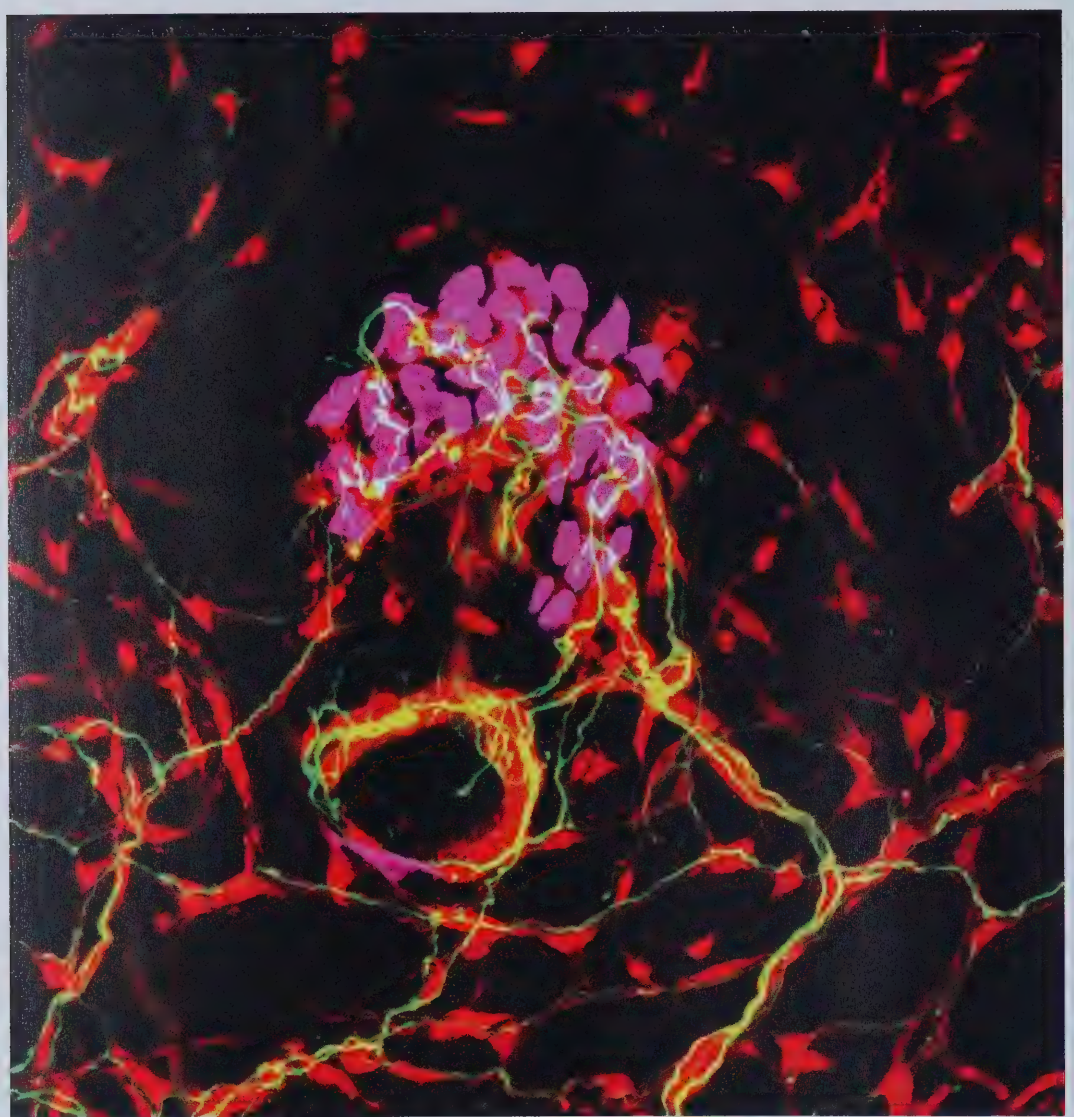
For two decades, researchers in the laboratory of David Ginty, the Edward R. and Anne G. Lefler Professor of Neurobiology in the Blavatnik Institute at HMS, have investigated the development, organization, and function of the neurons and neural circuits that underlie our sense of touch. Along the way, they have captured breathtaking images of cutaneous sensory neurons in action, illuminating how touch allows us to perceive and respond to our world.

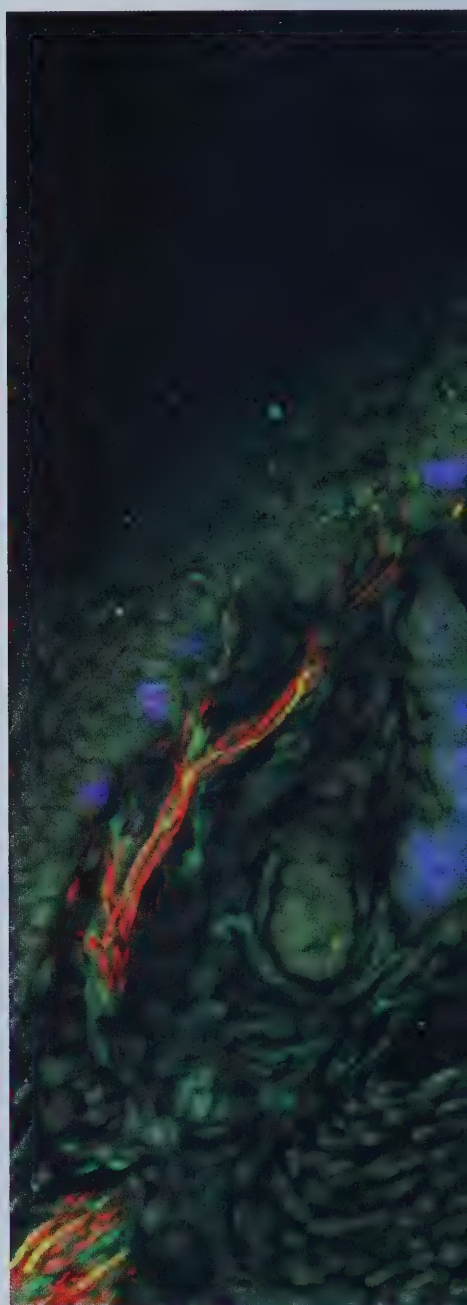


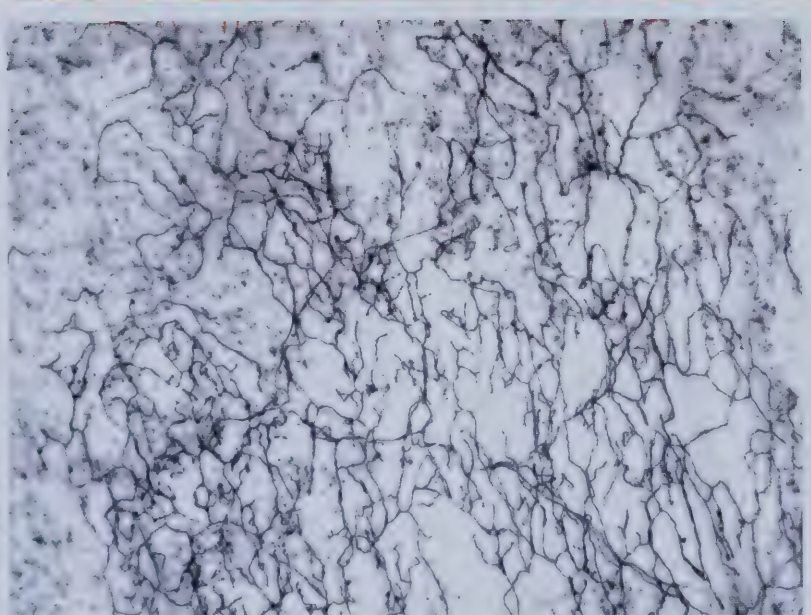


This follicle of a mouse hair (above, right) shows the endings of three types of sensory neurons, each capable of detecting changes affecting a hair shaft and surrounding skin. The longitudinal lanceolate endings (red) allow the neuron to respond to hair deflections while the neurons that travel the circumference of the follicle (green) respond to gentle stroking of the skin. The third type of neuron (also green) associates with specialized skin cells known as Merkle cells (blue discs). These neurons can respond repeatedly to indentation of the skin.

These skin cells (blue, right) and sensory neuronal endings (yellow) that terminate in close association with nonneuronal lamellar cells (red) make up mechanosensory end organs known as Meissner corpuscles. Highly sensitive to skin indentation, vibration, and gentle movement across the skin, Meissner corpuscles are found in the hairless skin of our fingertips.



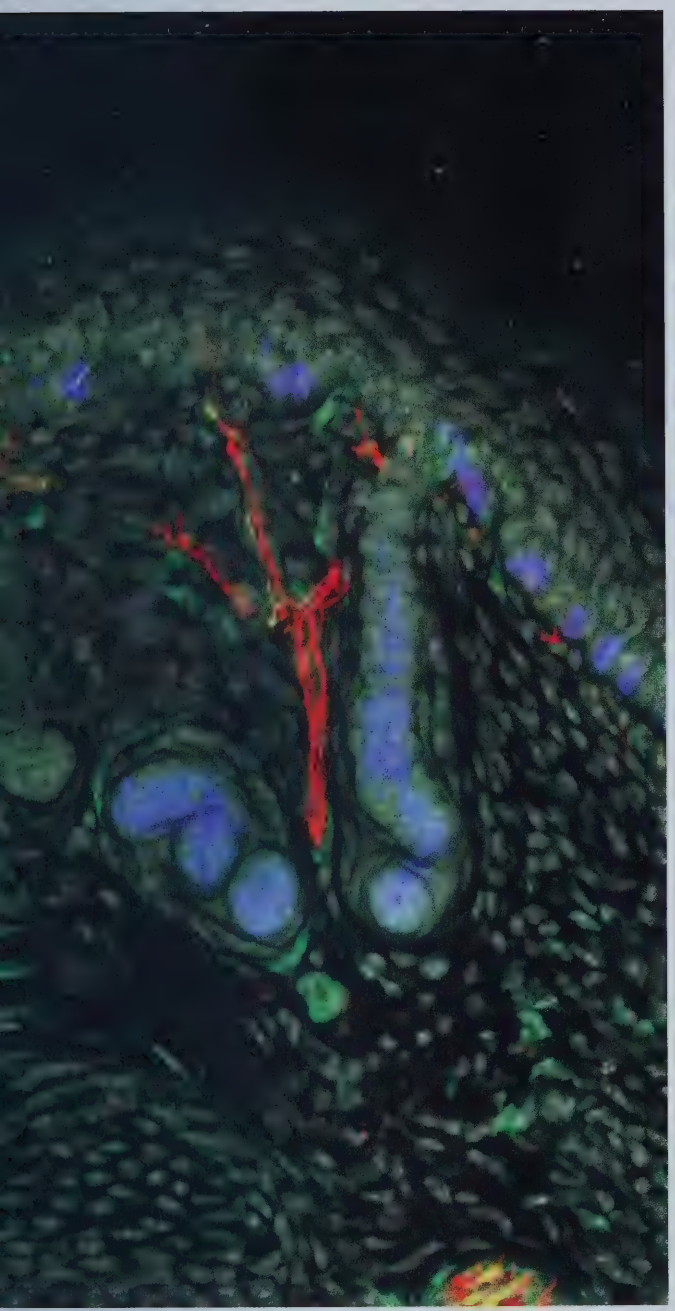




CELINE SANTIAGO (RIGHT); KATELYN GOMEAU, SHANNIL ZER (ABOVE)

Touch-sensitive neurons form specialized endings in the skin that are critical to our response to any light touch stimuli we might encounter. In this photo (above, left) touch-sensitive neurons (green or white) are associated with ensheathing support cells (red) and a group of touch-sensitive skin cells (purple) that are located around the mouth of a hair follicle. The green neurons that form circular structures with small spiking processes around a follicle respond to hair deflection. The neurons that form endings associated with the skin cells (purple) respond to skin indentation.

This black and white image (left) shows a single-labeled neuron that forms complex free nerve endings in hairy skin.







This confocal microscope image (above) shows sensory nerve endings (green and red) found in the hairless skin of palms, soles of feet, and fingertips. Sweat glands and specialized touch cells are shown in blue. The neuronal cells that send these endings to the skin detect light touch and can help in distinguishing textures and in sensing indentation to and movement on the skin's surface.

The interneurons highlighted in this photo (red and green, above right) are two of more than a dozen distinct types located in the dorsal region of the spinal cord. These interneurons receive direct input from several of the sensory neuron types that project to the skin.

This section of non-hairy skin from the forepaw of a mouse (right) shows the neurons that innervate the toe pad (green). A subset of glial cells that are closely associated with the axonal endings of the neurons (red) form around corpuscles in the toe pad.

CELINE SANTAGOSTINO; VICTORIA ABRAHAM (ABOVE)


(a)
(b)
Adenine
UV-B
Epidermis
Dermis
Fatty Tissue
Nerve
Dermoscopic Pattern

Sun, Skin, and Science

BY STEPHANIE DUTCHEN

DUNG HOANG

THERE WAS A LOT TO BE EXCITED ABOUT in the field of cancer care when F. Stephen Hodi began his fellowship in medical oncology at Dana-Farber Cancer Institute in the mid 1990s. But for patients with metastatic melanoma—cancers that begin in melanin-producing skin cells then spread to other parts of the body—he could offer little help.

Although new chemotherapy drugs and genetic insights were making inroads against many cancers, treatments for metastatic melanoma worked in only about 15 percent of patients. The median survival was 11 months.

Seeing two to four new patients each week with the disease, Hodi would ask himself, "Why are you doing this?"

Yet even while asking the question, he knew why: He, along with some other oncologists, suspected that this deadly disease might be vanquished by training the immune system to attack tumor cells.

"Trying to find that Achilles' heel posed a big challenge," Hodi recalls, "but it made it that much more interesting to get up in the morning and go to work."

Twenty-five years later, immune and targeted therapies, developed and tested by researchers including Hodi and others in the HMS community, have changed melanoma's narrative. Half of patients with metastatic disease now survive for at least five years.

Hodi, an HMS professor of medicine, the Sharon Crowley Martin Chair in Melanoma, and director of the Melanoma Center and the Center for Immuno-Oncology at Dana-Farber, says, "We still have a ways to go, but now patients have a fighting chance."

David Fisher, the HMS Edward Wigglesworth Professor of Dermatology and head of the Department of Dermatology at Massachusetts General Hospital, has similarly been thrilled to see—and to help—metastatic melanoma transform from "one of the worst diseases to treat" to "one of the more predictably responsive diseases" in little more than a decade.

The trajectory of the change, he says, has "really been wild."

The new treatments wouldn't have been possible without fundamental discoveries in immunology, genetics, skin cell biology, and cell signaling. HMS has long been a beating heart for these basic and clinical advances, and its scientists and physicians continue to push forward on multiple fronts, recognizing that melanoma's story has not yet reached a fully satisfying conclusion.

HMS clinicians and researchers are working to improve diagnosis and catch more melanomas early, when they're still self-contained and highly treatable. They seek to prevent or delay relapse, predict which melanomas will turn deadly and which will respond to immunotherapy, and reduce the side effects and costs of treatment. They also are pushing to devise treatments for patients with advanced melanoma who haven't benefited from the new therapies.

"With the advent of highly efficacious treatments, there's a tendency to celebrate the fifty percent who are cured, and we should, but it's time to buckle down and think about the fifty percent who don't make it," says Hensin Tsao, an HMS professor of dermatology and director of the Melanoma and Pigmented Lesion Center and the Melanoma Genetics Program at Mass General. "The sort of forgotten population."

Successes in the lab and the clinic, however, remain vulnerable. Clinicians, researchers, and public health leaders struggle to convince people to change behaviors that increase risk, while keeping a wary eye on a rising incidence of melanoma, prepare for the increased risks that ozone depletion and climate change have begun to unleash, and rally to confront the racial disparities that persist in survival rates.

"Science has melanoma on the run," says Tsao. "But it hasn't eradicated the disease in any way."

Rising sun

Skin cancers are far and away the most common cancers in the United States. Basal and squamous cell carcinomas make up the vast majority, with somewhere between 1 million and 5.4 million new instances diagnosed each year. However, because these two malignancies don't have to be reported to cancer registries, precise numbers aren't known: The cancer officially ranked as the most common in this country is breast cancer, with 270,000 new cases each year. Melanoma is ranked fifth, with about

100,000 new diagnoses expected in 2020, reports the American Cancer Society (ACS).

Melanoma may account for a small percentage of skin cancers, yet it causes an estimated 75 to 80 percent of skin cancer deaths. Caught early, it has a 99 percent five-year survival rate, but if it slips patients' and clinicians' notice, digs deeper into the skin and spreads beyond the lymph nodes, that rate can drop to 25 percent, according to the National Cancer Institute. The ACS predicts there will be 6,850 deaths in the United States from melanoma this year.

Although improved therapies for metastatic melanoma have helped tamp down death rates, incidence in this country has risen by about 4 percent per year since the 1970s, reports the World Health Organization. There are several theories as to why: Tissue that some doctors would consider precancerous, others are removing and reporting as melanoma abnormalities; most melanomas occur in older adults, and the U.S. population is aging; and more people may be baring unprotected skin to natural and artificial sunlight.

Light weight

The sun gives life, yet its light is not benign. Exposure to ultraviolet radiation remains the most significant environmental cause of melanoma—and the most preventable. A good deal of work by HMS researchers is helping to reveal exactly how sunlight leads to melanoma through genetic mutations and other changes in unprotected skin and through suppression of the immune system.

In this country, the incidence of melanoma has risen by about 4 percent since the 1970s.

Melanoma is more than twenty times more likely to arise in white than in Black people, the ACS reports. Although more skin pigment provides more protection, melanin itself has a sun protection factor, or SPF, of less than 5, says Fisher, suggesting that it functions physiologically as more than mere sunblock. He and others have clarified how different types of melanin raise or lower melanoma risk, and they've shown that any minimal benefit provided by tanning, such as the production of vitamin D, doesn't outweigh the DNA damage caused by UV exposure. These findings have inspired Fisher and colleagues to seek UV-free ways to stimulate the tanning pathway while also preventing melanoma.

Research by Fisher and others indicates why some people pursue risky behaviors even after they've had melanoma: UV exposure is addictive, activating reward centers in the brain in the same way opiates do. Fisher theorizes that the pleasure of soaking up the sun evolved to help ensure that the body synthesizes enough vitamin D.



To help explain why some people expose themselves to ultraviolet radiation despite having had melanoma, skin scientist David Fisher points to the fact that UV exposure is addictive, exciting areas of the brain in the same way opiates do.

"We're fighting an evolutionary drive," he says.

In addition to individual risky behavior, humanity is collectively compounding its melanoma risk. Depletion of the ozone layer, which absorbs high-wavelength, or UVC, rays and captures most medium-wavelength, or UVB, rays, has allowed more cancer-spawning radiation to reach Earth's surface. Ozone damage has slowed since international reductions in ozone-eroding chemicals went into effect in the 1980s, but experts say it will be decades before our planetary sunscreen is restored. The WHO estimates that because of ozone thinning, U.S. populations of European descent will see a 10 percent increase in skin cancer by 2050.

Melanoma incidence may rise further as the planet warms. A 2002 study in mice conducted by researchers in the Netherlands found that UV light becomes 5 percent more carcinogenic for each 1 degree Celsius rise in environmental temperature. This could disproportionately harm people whose access to shelter is limited as well as those who may spend more time outdoors as winters and the climate at higher elevations turn milder.

Close the gap

UV light isn't at the root of all melanomas. Some occur on non-sun-exposed or hairless skin, particularly the palms and soles and under the nails. These acral melanomas are most common in people with darker skin. Since health care providers aren't always

trained to look for cancers in these areas, and since melanomas there may look different from images traditionally featured in textbooks, acral melanomas tend to be caught later, when they're harder to treat, says Tsao. The result has been a schism in outcomes.

Fifty-two percent of Black patients and 26 percent of Hispanic patients receive their melanoma diagnosis after the cancer has progressed to a late stage, compared to 16 percent of white patients, reports the Skin Cancer Foundation, an international organization based in New York City. So while Black people are overall less likely to develop melanoma, those who do are more likely to die from it. The five-year survival rate, which runs as high as 94 percent among white people, languishes at only 70 percent among Black people, according to the foundation.

Then there are the rare, noncutaneous melanomas, which occur in mucous membranes or the eye. These also occur more often in non-white populations. Beyond being linked to a few inherited genetic mutations, the causes of these noncutaneous melanomas remain obscure, and the cancers themselves don't respond well to current therapies.

Mutations galore

As the Human Genome Project neared completion at the turn of the millennium, researchers leapt to understand which inherited, or germline, mutations raise the risk for melanoma and which acquired, or somatic, mutations in the tumor itself promote growth and metastasis and define therapeutic response. Geneticists, including Tsao and others at HMS and the Broad Institute of MIT and Harvard, have identified numerous germline and somatic mutations that help illuminate the genetic causes of this skin cancer.

Melanomas turn out to be packed with more mutations than any other cancer, and these mutations provide a wealth of targets that drug developers can aim for.

Melanomas turn out to be packed with more mutations than any other cancer, and these mutations provide a wealth of targets that drug developers can aim for. Although most of the genes have not panned out as targetable therapeutics, a few have led to breakthrough treatments.

The poster child is *BRAF*. About half of melanomas contain mutations in this gene, a link in a major signaling chain that regulates cell proliferation, differentiation, movement, and self-destruction. Most have the specific mutation V600E.

Researchers were able to identify a drug that could lock onto and disable B-Raf proteins containing the V600E mutation. In contrast to classic chemotherapy drugs, targeted therapies act on abnormal proteins found only in the tumor or its immediate vicinity. Chemotherapeutics attack any cell—friend and foe—that divides quickly.

The first B-Raf inhibitor for melanoma, vemurafenib, entered human trials, where clinicians led by Keith Flaherty, an HMS professor of medicine and director of the Henri and Belinda Termeer Center for Targeted Therapy at Mass General, demonstrated that it indeed improved survival for participants with late-stage disease. In 2011, it received FDA approval.

"It was pretty extraordinary," recalls Tsao, who as a cancer geneticist was delighted to see anti-B-Raf therapies make a dent in the disease. "In less than a decade, they went from identifying the first mutation in *BRAF* to a B-Raf(V600E)-specific drug. The era of molecular therapies came into being."

Researchers developed other inhibitors for B-Raf as well as for a related protein, MEK. Again, Flaherty took a leading role in demonstrating their effectiveness—and showing that in combination, B-Raf and MEK inhibitors are even more powerful and produce fewer side effects. One of the drugs developed for melanoma has also worked for non-small cell lung cancer.

Research continues in an effort to solve challenges associated with B-Raf inhibitors and other targeted therapies. First, their effects wear off over time, with about half of patients developing resistance after six months. Solutions to this problem may soon come as Flaherty and others have uncovered reasons why some melanomas become resistant.

In addition, B-Raf inhibitors sometimes stimulate growth of other skin cancers and precancers even as they attack melanoma, requiring a supplemental treatment. In 2019, Michael Eck illuminated the problem. Eck, a professor of biological chemistry and molecular pharmacology at HMS and professor of cancer biology at Dana-Farber, used cryo-electron microscopy to capture the first high-resolution images of B-Raf bound to MEK and another key protein in active and inactive states. His

"With the advent of highly efficacious treatments, there's a tendency to celebrate the fifty percent who are cured, but it's time to buckle down and think about the fifty percent who don't make it."

work suggests ways to prevent this collateral damage.

Self-defense

Certain types of immune cells attack anything they perceive as harmful. For these cells each mutation, each unfamiliar protein in a tumor, provides, Fisher says, a "wonderful opportunity for the immune system to say, Oh, what is this terrible thing? Destroy."

Cases of immune system attacks on cancer have been recorded for more than a century, including spontaneous remission of melanomas and other skin abnormalities. Martin Mihm Jr., an HMS professor of dermatology, part-time, and director of the melanoma program and the Mihm Cutaneous Pathology Consultative Service at Brigham and Women's Hospital, helped demonstrate that the presence of white blood cells in melanomas, called tumor-infiltrating lymphocytes, signals better outcomes from the disease. He continues to study tumor-infiltrating lymphocytes to improve prognostic accuracy, and others are investigating them as a melanoma treatment option.

Despite the clues that immune cells could be powerful anticancer allies, it was clear that they didn't always, or even often, win the battle. Until recently, attempts to bolster immune responses met with mixed success. Finally, in the early 1990s, researchers discovered a crucial reason why: Cancer cells don camouflage.

"The tumor appears to push back with a signal that says, Hold on. I'm part of you," says Fisher.

Attempts to bolster immune responses met with mixed success. Finally, researchers discovered a crucial reason why: Cancer cells don camouflage.

Biologists over the next 20 years identified the molecular camouflage and devised ways to strip it off. They found that many of the body's healthy cells have surface proteins that bind to other proteins on T cells and send a "do not attack" signal. They further discovered that tumor cells can sprout proteins that trick these so-called immune checkpoints, sending false signals for the T cells to stand down.

Using those insights, researchers showed that blocking one of the key proteins—whether on the T cells, such as CTLA-4 or PD-1, or on the tumor cells, such as PD-L1—exposes the tumors as dangerous and releases the brakes on the immune system. Arlene Sharpe, MD '82 PhD '81, the George Fabyan Professor of Comparative Pathology and chair of the Department of Immunology at HMS, and Gordon Freeman, PhD '79, a professor of medicine at HMS and Dana-Farber, made pivotal contributions to the understanding of immune checkpoints and their inhibition.

Finally, immune checkpoint inhibitors dangled within reach like ripe fruit, and melanoma researchers lifted their hands. Hodi, who meets regularly with Sharpe and whose office is a few doors down from Freeman's, ran the first Phase III trial of a CTLA-4 inhibitor. Although many participants still died from metastatic melanomas during the trial, a significant number responded to the treatment. Immune cells at long last reached their potential for treating cancer.

"We saw clumps of white cells and dead melanoma cells in previously intractable lymph node and brain metastases," says Hodi of tissue samples from participants early in the trial, "so we knew there was something potentially powerful happening. We couldn't give up on that."

That something powerful led to the drug ipilimumab, which received FDA approval in 2011 for late-stage melanoma. It was the first immune checkpoint inhibitor for any cancer. Inhibitors of PD-1 and PD-L1 followed. The first two of those, approved for late-stage melanoma in 2014, now treat more than a dozen other cancers, including kidney, colorectal, and endometrial cancers. Researchers have gone on to develop four more FDA-approved checkpoint inhibitors that tackle a variety of cancers.

Immune checkpoint therapies can provide longer disease control for melanoma patients than other therapies, but they are expensive. Reducing their cost will be



Hensin Tsao

necessary to ensure equal access and spare health care budgets. Another shortcoming: some patients develop immune overactivity and need additional treatments or to stop immunotherapy treatment. About half of patients do not receive a long-term benefit.

"It's humbling how little we understand about the immune system," says Hodi.

No dearth of ideas

In less than two decades, melanoma has risen from failing student to head of the class.

"Melanoma led the way as a proof of principle that you can use immunotherapy as a general rather than as a disease-specific treatment modality," says Hodi.

"I do think melanoma has had a disproportionate influence," says Fisher, who is also director of the Cutaneous Biology Research Center at Mass General and the Melanoma Program at the Mass General Cancer Center, "particularly in the immunotherapy space. It jump-started the most important chapter in recent memory. Hopefully that progress will continue."

But melanoma researchers at HMS are not resting on any laurels. Investigation continues in an effort to improve all stages of the patient experience, from prevention to cure.

Mihm laid foundations in the 1960s and '70s for early detection and classification of melanoma into subtypes. Tsao recently published a paper detailing a range of melanoma presentations to help clinicians catch these malignancies earlier, improve consistency, and reduce disparities. Fisher hopes to see noninvasive diagnostic methods in the near future. Such tools could reduce unnecessary biopsies. Today, for each person who receives a melanoma diagnosis, there are an estimated twenty-five people whose biopsies do not reveal melanoma.

To improve prognosis, Tsao hopes genetics will help researchers predict more than just the risk of cancer. His next goal is to identify inherited changes that can predict the risk of developing a lethal cancer. For instance, Tsao and Ivana Kim, an HMS associate professor of ophthalmology at Massachusetts Eye and Ear, showed that germline mutations in the gene *BAP1* may increase the risk that a melanoma in a specific layer of the eye, the uvea, will metastasize.

To halt earlier-stage melanoma in its tracks, researchers are exploring the use of immune checkpoint blockades and targeted therapy to prevent the return or spread of cancer. So far, B-Raf and PD-1 inhibitors appear to cut relapse rates in half for patients with stage 3 melanoma, where disease has crept into the lymph nodes. Although it's too early to tell, Fisher and others hope that those cases represent not just a delay in relapse but permanent eradication.

In cases where melanoma does advance, HMS researchers are teaming up to improve current treatments and identify new ones.

They're testing checkpoint inhibitors in combination with each other and with targeted therapies. They're working to evolve the immunotherapies themselves to help more patients and reduce adverse events. A major short-term goal is to predict who will respond to checkpoint therapy so those who won't can seek alternative treatments and be spared the side effects.

To halt earlier-stage melanoma in its tracks, researchers are exploring the use of immune checkpoint blockades and targeted therapy to prevent the return or spread of cancer.

They're building better vaccination treatments, including adding antigens to tumors that flag melanoma cells for immune attack. They're engineering therapeutic viruses to prefer cancer cells, both killing the cells directly and drawing the immune system in afterward. And they're investigating not only the best combinations but also the best order in which to deliver treatments.

The path for developing entirely new therapies is not yet clear, says Hodi, who is himself exploring the possibilities of manipulating tumor blood supply and modeling the three-dimensional tumor microenvironment in collaboration with neighbors at the Wyss Institute for Biologically Inspired Engineering.

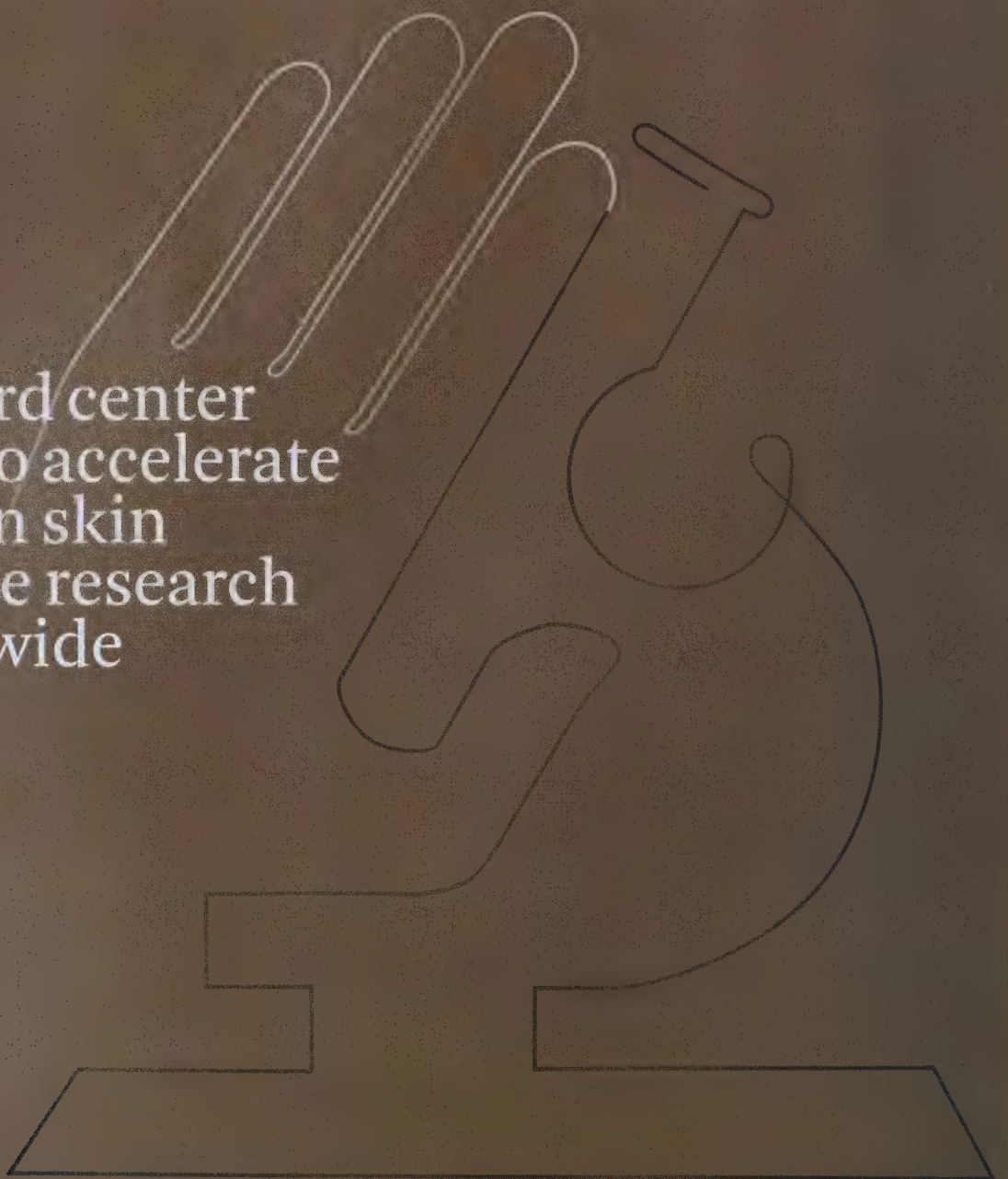
"To get past that fifty-percent bar, we have to take a step backward and return to basic investigation, basic principles, basic questions," he adds.

Conversations continue among clinicians and scientists across specialties, sparking new ideas for how to raise survival rates until the day arrives when we can look back in disbelief that metastatic melanoma was once a death sentence.

Stephanie Dutchen is a science writer in the HMS Office of Communications and External Relations.

"Melanoma led the way as a proof of principle that you can use immunotherapy as a general rather than as a disease-specific treatment modality."

Harvard center aims to accelerate human skin disease research worldwide



Direct Approach

BY JESSICA CERRETANI

Understanding how and why the body might reject a face transplant ■ Improving the ability to predict the recurrence of melanoma ■ Parsing the role of T cells in autoimmune disease

These seemingly disparate projects share common threads: Each uses human tissue samples to research diseases of human skin. And each is among the many projects supported by the Human Skin Disease Resource Center at Harvard Medical School and Brigham and Women's Hospital.

The center is one of a select group of its kind funded by grants from the National Institutes of Health. Its mandate is to provide collaborating researchers at academic institutions around the world with access to human specimens and the most advanced analytic techniques needed to study them. Its goal, says the center's director, Rachael Clark, MD '98 PhD '98, the Shing-Yiu Yip and Cecilia M. Hepp Associate Professor of Dermatology at Brigham and Women's, is to accelerate human skin disease research.

The right tools

Although most NIH-funded centers focus on specific diseases, the Human Skin Disease Resource Center takes a different approach. It focuses on providing the very best tools for human translational skin disease research to spark study and further the understanding of an array of diseases.

The center was developed by Clark out of a sense of frustration that "over ninety percent of therapies that cure cancer in mice, fail in clinical trials." There are differences between humans and experimental animals such as mice and these differences are not fully understood. As a result, many studies in mice never lead to better therapies.

Although research using human cells and tissues could help close gaps in our knowledge of various diseases, barriers to conducting high quality human research remain. The center aims to eliminate these barriers.

"Human research is difficult to conduct and difficult to get published," says Clark. "The center is clear evidence of the NIH's investment in helping patients."

The center seeks to support each investigator's needs. Some research teams, for example, require access to rare tissue specimens. For them, the center facilitates the academic collaborations and proper approvals necessary to carry out the work in a way that respects both the policies of the collaborating institutions and the trust that patients place in those institutions when they visit them for care.

Other research groups require access to the most advanced analytic techniques used for the study of human disease, techniques that are available only at well-supported academic medical centers. By helping researchers gain access to such transformative tools, the center hopes to spur research that will lead to new treatments for patients.

Local talent

Such collaborations have already led to a spate of innovative human studies, with more on the way. In the fourth year of its five-year grant, the center has partnered with top investigators, serving as a hub for academic research. And while the center is used by institutions near and far, some of the more inspired research projects have occurred right in its own backyard.

One such study involved Thomas Kupper, chair of the Department of Dermatology at Brigham and Women's and Dana-Farber Cancer Institute, and Wiebke Pruessmann, a postdoctoral fellow at Brigham and Women's. These researchers studied skin specimens from the center and from a team of international collaborators to investigate ways to identify patients most at risk for recurrence of melanoma. The results, published in the January 2020 issue of *Nature Cancer*, used a new quantitative DNA sequencing technique to form sophisticated predictions about which primary melanomas are likely to recur and spread.

Likewise, the center is helping Bohdan Pomahac, the Roberta and Stephen R. Weiner Distinguished Chair in Surgery at Brigham and Women's, and Thet Su Win, a Harvard resident in dermatology, study the immunologic events underlying rejection in face transplant recipients. Brigham and Women's has the largest cohort of face transplant recipients at a single center in the world. Studying how to control rejection in these patients is providing new knowledge on how the immune system protects skin.

Clark is particularly proud of the center's role in helping to support junior investigators, who often lack funding to undertake translational research. She hopes that the young postdocs continue to make pioneering discoveries in skin disease research wherever they land.

"Our goal," she says, "is to export our expertise outside of the Harvard system of hospitals so that everyone can benefit from it. It always comes back to helping patients. They're the reason why we do everything we do." HM

Jessica Cerretani is a Boston-based writer.



The self-doubts that many high-achieving people develop when facing the demands of academics or a profession can be crippling

Tailored for Perfection

BY JAKE MILLER



IN THE UNDERGRADUATE ENGLISH ADDRESS HE delivered during Harvard's 2020 commencement day ceremonies, Michael Phillips told of the dawning uncertainties he and other classmates felt as they advanced through their years at the College. Although "the more we progressed, the more we pursued," something had changed. "Our community of collaboration converted to one of crippling comparison … subdued by the darkness of self-doubt." Impostor syndrome, he said, settled upon him, and "felt like the incessant pain of a paper cut—or worse." He and his classmates had imagined that during their college years, they would be defined by their "pursuit of passion," but instead they had become "troubled by the fear of rejection."

Phillips is far from alone in experiencing such psychological uncertainty, of seeing the joy of attaining goals strangled by the fear and worry of not measuring up, not having the stuff necessary to achieve one's dreams or succeed within a community of exceptionally capable future leaders.

Impostor syndrome, the phenomenon he references, is thought to affect more than half of all medical students, trainees, and physicians. For many, the associated symptoms of anxiety, emotional exhaustion, and depression can cause them to struggle academically and personally. For some, symptoms can escalate to burnout, suicidal ideation, and even attempts at suicide. And while the syndrome is not considered a mental disorder—it's not listed in the *Diagnostic and Statistical Manual of Mental Disorders*—it is of great enough concern to precipitate action by psychiatrists, medical educators, and leading physicians at HMS and elsewhere, all seeking to develop programs and change institutional cultures to alleviate its harms.

Roots of doubt

The term impostor syndrome was introduced in 1978 by clinical psychologists Pauline Rose Clance and Suzanne Imes in a paper in *Psychotherapy: Theory, Research and Practice*. The work described "feelings of intellectual phoniness" that were prevalent among the select sample of high-achieving women who participated in their study. Despite the outstanding academic achievements of the women, the two researchers wrote, they "persist in believing that they are really not bright and have fooled anyone who thinks otherwise."

Since Clance and Imes's early work, researchers have found a notable, at times significant, prevalence of the syndrome in both women and men and across cultures and ethnic groups. A literature review published in *Medical Education in Review* earlier this year looked at eighteen papers that assessed impostor syndrome in medical students, trainees, or attending physicians throughout the world. The studies reported rates of impostor syndrome between 22 and 60 percent within the specific groups measured.

Among the papers reviewed were two that measured the prevalence of the syndrome in groups of U.S. medical students. One study reported 30 percent of the students had clinically significant impostor syndrome, with perfectionism and the syndrome strongly associated with an increased risk for distress, while another study reported that nearly 40 percent of its participants showed symptoms of impostor syndrome, including feelings of emotional exhaustion and depersonalization. Similarly, two studies of medical students in Pakistan indicated prevalence levels of the syndrome that approached 55 and 48 percent within the respective cohorts. A study involving medical students in Nigeria found nearly 23 percent had clinically significant indications of the syndrome coupled with low self-esteem.

Inside and out

The self-doubts associated with impostor syndrome typically surface during times of transition, when a person's fears of fresh scrutiny of their knowledge and abilities by a new set of colleagues or classmates arise. The transition to college, for example, can be difficult.

A 2016 paper in *Psychological Medicine* found that mental health disorders are common among college students but usually start before they enter college. Unfortunately, these disorders often go untreated and can affect educational and psychosocial functioning in subsequent years.

One of the authors of that paper was Stephanie Pinder-Amaker, an HMS assistant professor of psychology and director of McLean Hospital's College Mental Health Program. Each year, McLean treats as many as 1,100 students from more than 200 colleges and universities who seek treatment for a broad range of psychiatric illnesses. Much of this influx occurs at the beginning of the academic year, when students confront their new college lives.

The program at McLean takes a multifaceted approach to addressing conditions such as anxiety, depression, eating disorders, obsessive-compulsive disorder, and substance use disorders, many of which can manifest in individuals with impostor syndrome.

It also takes a holistic approach to college mental health. It works directly with students undergoing treatment and also works with college and university administrators to help them implement systemic changes that support students with mental illnesses. This support can include providing comprehensive counseling services for students and other community members and identifying ways to reshape campus cultures to prevent new problems from developing.

Environmental protection

According to Pinder-Amaker, students point to stress as the number one impediment to campus well-being and academic performance: Feeling like a fraud is a remarkably prevalent stressor.

Feeling like a fraud is a remarkably prevalent stressor.

"If you understand impostor syndrome in the context of the broader range of experiences that can threaten an individual's sense of belonging or sense of being safe or worthwhile or worthy, there's a different level of appreciation that leads us to a different set of strategies," she says.

Since these experiences don't occur in a vacuum, Pinder-Amaker says that addressing impostor syndrome on campus requires taking a broad view of the ecosystem.

"It's not enough to inoculate individual students by teaching them coping skills and strategies," she says. "We want to do more than make it possible for students to merely cope. We want to create conditions in which they can excel and thrive."

According to Pinder-Amaker, it's important to develop counseling systems and to implement specific interventions that can address impostor syndrome. These might be something as simple as telling students that the feelings they are experiencing have a name, that they are extremely common, and that their professors and mentors likely have felt, or still sometimes feel, the same way. Giving it a name, demystifying it, talking about it, and providing research about the prevalence of the impostor phenomenon can be a great help, she says. So can


Stephanie Pinder-Amaker

collecting and revisiting positive feedback to ward off feelings of being an impostor.

Equally important is identifying and addressing deeper issues, such as the subtle but significant harms caused by implicit bias, stereotype threat, and microaggressions. These social and cultural factors have been shown to heighten stress and lead to great harm to an individual's overall health. Such harm also impedes academic performance and thus feeds the loop of questioning self-worth.

Safe space

For students, trainees and faculty, their time at HMS can be filled with circumstances that challenge their feelings of self-worth, especially when confronted with the considerable accomplishments of peers.

Although the School's students cite their classmates as one of the best aspects of being at HMS, they also report that they often feel that their being admitted to the School must have been a mistake, says Edward Hundert, MD '84, HMS dean for medical education.

Sometimes, he notes, this kind of self-questioning can be a powerful motivator.

"Education arises from some ingenious balance of challenge and support," says Hundert.

"Part of the challenge that students face is asking themselves if they're learning enough compared to those around them. You do want people to wonder what they still need to learn, to wonder what others know that they don't."

Students report that they often feel that their being admitted to the School must have been a mistake.

Yet, it's vital to create an environment where this type of comparison is replaced by collaboration, where students can share their knowledge, their skills, and their feelings of doubt.

"We're all here to teach each other and learn from each other," Hundert says. "It can be especially powerful when a student asks an instructor a question and the instructor says, 'I don't know, but let's work together to find the answer.'"

Hundert says the myth of "effortless perfection" is a helpful concept for understanding—and disarming—the potential harmful effects of impostor syndrome.

The term effortless perfection arose from a 2003 study by a committee of the Women's Initiative at Duke University, which scanned the social, academic, and cultural environment of women on its campus. Many students described feeling compelled not just to excel in every aspect of their lives but to do so in a way that made it all look easy.

Hundert likens this to a duck swimming in a swift current. On the water's surface, the duck sits serenely, seemingly floating without effort, while below it is paddling furiously.

That underwater frenzy is what's going on emotionally for many students when they are faced with the culture of medical school. According to Hundert, the lecture style once common in medical schools helped magnify those feelings.

"Each faculty member would come in and 'trippingly on the tongue,' as Shakespeare wrote, give all this incredible detail about a specific biochemical pathway or whatever the subject of the lecture happened to be," says Hundert.

It seemed so natural, he says, "it was as if you could have tapped them on the shoulder as they were walking down the street on any given day and they would have been able to give you all of that detail without even pausing to think about it."

The net impression over the course of a school year was that all professors had an astonishing command of the entire breadth and depth of medical knowledge, and somehow each student had to know it all, too. But, Hundert adds, this is far from the truth. Those teachers often prepared hard the night before their lectures so they could make it look effortless.

The new case-based collaborative learning curriculum was designed to create a space of "psychological safety" where students and faculty alike are encouraged to ask questions, show doubt, and admit that they don't know everything.

The goal, Hundert says, is to help students become the kind of doctors who are always asking how much more they can learn, especially with new knowledge being uncovered at an ever-accerating rate. Toward this end, he says, medical education should not be about the transmission of knowledge but about the transformation of the learner; not the number of facts at a student's instant command but about how well they can "navigate through information" and continually learn. Helping students overcome their feelings of being the wrong

"It's not enough to inoculate individual students by teaching them coping skills and strategies. We want to create conditions in which they can excel and thrive."

person in the wrong place and exploding the myth of effortless perfection can open a pathway for physicians to continue growing and learning throughout their careers.

All together

As the School revises and updates its education model to build more collaborative lifelong learning, HMS leaders and faculty say it is also important to work on strengthening the School's mental health and wellness programs, examine its broader social environment and that of the profession and of society, and look for opportunities to create a more supportive cultural context for all students and physicians.

HMS Dean for Students Fidencio Saldaña, MD '01, says that part of this process of program evaluation is recognizing impostor syndrome and directing students to services and techniques they can use to cope with the stress and challenges they face. Like Hundert, Saldaña feels that stress, properly managed, can be a tool for accelerating learning.

"You don't want to tip over the line to anxiety," he says. "There's a sweet spot of activation and peak performance between too little stress and too much."

The critical thing is to help the student when that stress becomes too much. HMS has developed several wellness initiatives that offer counseling and support services and, for students who need it, can include referrals for cognitive behavioral therapy or involvement in well-being practices such as yoga, sleep management programs, and meditation.

This effort is part of a much bigger project, Saldaña says. "It's easy to put a program together. It's harder to change a culture."

Making the curriculum more collaborative is important, but other elements of the culture might still favor competition or send signals that make individuals feel they don't belong.

For example, Saldaña says he's had to rethink what he asks students to share during "break-the-ice" meetings. He used to ask students to share their name, where they're from, and one fun fact about themselves.

"You could see the wheels turning as they tried to think of the most impressive fun fact about themselves," he says. Lately, he's instead been asking students to share a favorite childhood memory or share something that brings them joy, which seems to establish a more collaborative spirit in groups.

In the spirit of building self-worth, during the students' orientation, Saldaña likes to tell them that they don't have to live up to someone else's image of success.

In that same spirit of building self-worth while easing the tensions inherent within this group of high performers, during the students' orientation to the School, Saldaña likes to tell them that they don't have to live up to someone else's image of success—they define what success means to them.

"We want the students to be able to perform to their full potential, and the impostor syndrome is one thing that may get in the way," Saldaña says. "As leaders, we have a responsibility to change the culture to make sure that each student can perform to their potential."

If HMS students are like most medical students, or like most successful people in any field, from time to time they will likely feel that they are not worthy of the success they've achieved or are not ready for the challenges that lie ahead.

But Saldaña reassures them that, should they need it, help is at hand.

"Once a student is part of this family, it's really important to us that we empower them to reach their potential and their own definition of success," Saldaña says.

Jake Miller is a science writer in the HMS Office of Communications and External Relations.



An 1887 book on skin diseases helps establish the field of dermatology in the United States



This portrait of James Clarke White was made during his years as president of the Massachusetts Medical Society, 1892-94.

MEMORIAL TRIBUTES to James Clarke White, MD 1856, follow a familiar formula: beloved colleague, influential Harvard citizen, and respected clinician. However, with White, the prose nearly matched the product, particularly within his specialty, dermatology.

In 1863, White taught the first HMS course on skin diseases. Starting in 1870, he headed Massachusetts General Hospital's first department of skin disease, holding the position for 33 years. By 1871, White was Harvard's, and this nation's, first professor of dermatology. At his death in 1916, his peers celebrated him as foremost among this country's dermatology pioneers.

It was White's wide personal and professional experience that made him such an able specialist, a depth of knowledge and skill perhaps most evident in his 1887 *Dermatitis Venenata: An Account of the Action of External Irritants Upon the Skin*. This first-of-its-kind compendium on the damaging effects on the skin of different vegetable, animal, mineral, and "not easily defined" matter drew from White's pursuits as a naturalist and a clinician.

Growing up in Belfast, Maine, White generated a small museum of local flora and fauna. In his undergraduate diary, he recorded the birds he shot and stuffed as the curator of ornithology for Harvard's Natural History Society. He was a long-time member of the Boston Society of Natural History and spent a decade as its comparative anatomy curator. In *Dermatitis*, White the naturalist is on full display, whether recounting his own experiences with poison ivy or the burning in the mouth produced by eating jack-in-the-pulpit tubers.

Dermatitis also highlighted White's deep knowledge of chemistry. In addition to exploring the damage wrought by substances like mercury, White examined irritants and affected areas chemically and microscopically. During his student years, he frequented the basement laboratory of Harvard Professor of Chemistry Josiah Parsons Cooke, and his research there eventually led to his 1856 Boylston Prize-winning essay, *Analysis of Urinary Calculi in the Warren Museum*, perhaps the earliest example of original research using the museum's holdings.

White's first Harvard appointment was not in medicine but in chemistry, as an instructor and later as an adjunct professor. He committed to dermatology full-time in 1871 and took his formative experience as a chemist with him, generously applying it throughout the pages of *Dermatitis*.

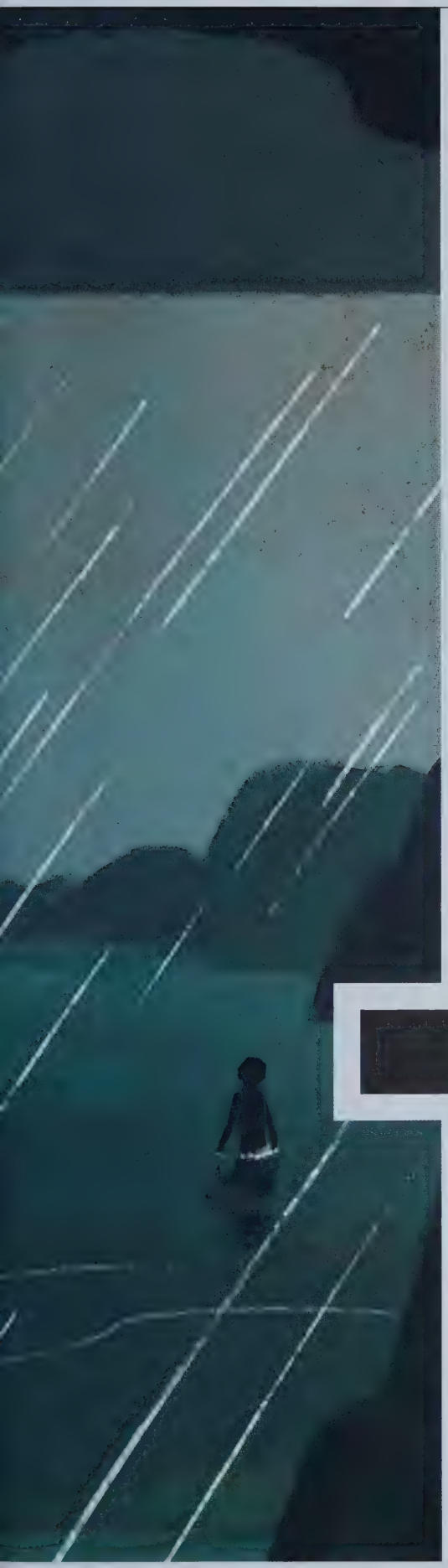
With Harvard University President Charles William Eliot, a fellow chemist, White helped lead a reform movement at HMS, successfully advocating for a three-year course of study, written rather than oral exams, and an emphasis on laboratory teaching. In an 1870 address on this reform, White extolled incoming HMS students: "You have entered, then, upon the study of a science always changing, to be ever new. … As long as the science of medicine progresses, you must advance with it." Not immune to his own advice, White published *Dermatitis Venenata: A Supplemental List* in 1903.

—*Dominic Hall*

Dominic Hall is curator of the Warren Anatomical Museum in the Center for the History of Medicine at the Francis A. Countway Library of Medicine.



The outsized toll COVID-19 has taken on people of color reflects the insidious effects of structural inequity



ANGELA HSIEH

Who'll Stop the Rain?

BY ELIZABETH GEHRMAN

THE STATISTICS ARE ALARMING. Between March and June of 2020, Latinx and non-Hispanic Black people were hospitalized for COVID-19 at a rate of up to four and a half times that of non-Hispanic white people. Indigenous people were hospitalized at five and a half times that of white people. And as of late July, the Navajo Nation, which has a population of only about 175,000, had seen more coronavirus cases per capita than any U.S. state, while Black people, who make up only 13 percent of the U.S. population, accounted for one-quarter of COVID-19 deaths—2.3 percent more than white people, who represent around 60 percent of the population.

These numbers may be shocking, but to those who study health disparities, they're hardly surprising. "It was totally predictable that marginalized groups would experience higher infection rates," says Eugene Richardson, an assistant professor of global health and social medicine in the Blavatnik Institute at HMS. "It's almost a given."

Early headlines noted more risk factors among populations of color, but the real reasons for these differences go far deeper than many news organizations initially reported.

"To say Black people are having worse outcomes because they have more diabetes and obesity and things like that suggests their personal choices are at fault," Richardson says. Blaming the victims, experts maintain, ignores the social realities created by 400 years of U.S. history and exacerbated by the biggest wealth gap ever recorded.

A report published in June by Inequality.org, a project of the Institute for Policy Studies, stated that the combined wealth of this country's 640 billionaires—$3.581 trillion—was more "than the entire Latino population combined." The report, "White Supremacy Is the Pre-Existing Condition," further noted that "total U.S. billionaire wealth is equal to 76 percent of all Black wealth combined."

This wealth gap existed before the pandemic but has worsened during it. Between March and June, the report notes, wealth held at the top increased by more than $637 billion, "the equivalent of more than 13 percent of all Black wealth." As that was happening, 45 million nonbillionaires filed for unemployment, with many losing their health insurance along with their jobs.

Not that having insurance guarantees good health. "Leading a healthy life is not just determined by our access to personal health care services," says Mary Bassett, the François-Xavier Bagnoud Professor of the Practice of Health and Human Rights at the Harvard T.H. Chan School of Public Health and a former commissioner of the New York City Department of Health and Mental Hygiene. "What some people refer to as the social determinants of health—housing, education access and attainment, low income despite working two or three jobs, environmental conditions, stress—these affect health in ways that are both direct and indirect."


Mary Bassett

Shelter from the storm

Many health advocates say deficiencies in these social indicators are the result of a system rigged against communities of color. A 2019 white paper by the Urban Institute, an economic and social policy think tank, reports that the racial gap in home ownership is worse today than it was in 1968, when the Fair Housing Act made redlining, or designating Black neighborhoods as poor investments for lenders, illegal. Though redlining has been outlawed, its legacy remains in the form of persistently lower housing values in neighborhoods formerly redlined. Other issues continue to contribute to the problem, including unequal access to credit, particularly in the form of mortgages, and credit-scoring systems many researchers consider biased; higher interest rates for Black and Latinx people; and predatory lending practices that, during the 2008 housing crisis, led to more foreclosures, losses from which many Black and Latinx families have not recovered.

Home ownership matters because "it's the principal source of intergenerational wealth transfer," says Bassett. "Central to how many people get rich is inheriting from their parents."

When owning is out of the question, renting is the only answer, but affordable units are often substandard and, Bassett maintains, "dilapidated housing may expose you to pest infestation, lead in paint or water, and overcrowding," all of which can lead to health problems such as asthma, lead poisoning, heart disease, and neurological disorders, according to a 2016 Brookings report.

Gentrification and health care-related bankruptcies can also send people into unstable housing or homelessness, says Oni Blackstock, MD '05, a primary care and HIV physician and former assistant commissioner of the New York City Health Department's Bureau of HIV/AIDS Prevention and Control. This instability makes it harder to stay on prescribed medications, keep medical appointments, and maintain healthy levels of the stress hormone cortisol, which helps control inflammation, blood glucose levels, blood pressure, and sleep.

"Housing is health care," Blackstock says. She points out that housing is still largely segregated, and communities of color live disproportionately in areas with higher levels of air pollution and other environmental issues that imperil overall health. Plus, people living in poverty tend to experience crowding at home. "Being able to socially distance is really a privilege," she says.

The racial gap in home ownership is worse today than it was in 1968, when the Fair Housing Act made redlining illegal.

Without a raft

Housing also adversely affects educational attainment, which remains significantly lower among people of color than among white people at all economic levels, according to data from the 2020 National Equity Atlas. Educational inequity combined with occupational discrimination, the decline in affirmative action programs, and budget-cutting around human services that might help level the playing field means workers of color often must take lower-paying, unskilled jobs that, according to Blackstock, allow for less social mobility. In this pandemic, such jobs have also increased workers' chances of becoming infected, with Black and Latinx people much less likely to have jobs that can be done remotely.

For many, pandemic relief has been inadequate, increasing the dangers for even those workers deemed essential. "In states where unemployment payments are hard to get or are too low," says Stephen Martin, MD '02, an associate professor of family medicine and community health at UMass Medical School, "people—even those who need to quarantine—are incentivized to work so they can keep food on the table and a roof over their heads. That puts them and their families at greater risk of illness."

Incarcerated populations are even less protected, confined to unsanitary, overcrowded cell blocks that often lack proper ventilation and, in many cases, have a record of health code violations. The pandemic has cast a harsh light on what these conditions can mean for people who must endure them. The Marshall Project, a nonpartisan news organization that focuses on the U.S. criminal justice system, has been collecting data on COVID-19 testing, infections, and reported deaths in prison populations and among the prison workforce. Between the first week of April and the first week of

August, nearly 87,000 prisoners and just over 19,000 prison staffers tested positive for the disease and more than 800 incarcerated individuals and 62 prison workers died from it. As in the nonincarcerated population, these counts are likely lower than the number actually infected.

In June, a transfer of about 200 untested prisoners to San Quentin State Prison led to it becoming a hot spot in California, with more than 2,000 prisoners testing positive for COVID-19 and 25 deaths before the corrections department began working to control the situation.

The Sentencing Project, a social justice organization based in Washington, DC, estimated in 2018 that Black adults are almost six times as likely to be incarcerated as white adults and Hispanic people are more than three times as likely. Given these statistics, many of those affected by COVID-19 in prisons have been people of color. Because of the disease, says Bassett, "prison sentences have turned into death sentences. People may lose their freedom, but they shouldn't lose their right to life."

More than 800 incarcerated individuals and 62 prison workers have died from COVID-19.



Oni Blackstock

To top it all off, the U.S. public health system has been gutted. "Resources for public health have been going down for years," says Margarita Alegria, an HMS professor in the departments of medicine and psychiatry and chief of the Disparities Research Unit at Massachusetts General Hospital. Per capita public health spending has fallen by 9.3 percent since 2008, according to a 2016 paper in the *American Journal of Public Health*. The threats have only increased; in 2017 the American Public Health Association called out the massive cuts the White House proposed to public health as well as the proposed changes to health insurance for low-income people in the United States.

Hostile conditions

"Even four years ago when I was on the population board of the National Academies of Medicine, which looks into public health issues, one thing we kept hearing was how resources for public health had gone down," says Alegria. "Public health wasn't seen as very important, so it kept getting cut, but you can see where that got us." Although you might expect that to change during a pandemic, in its proposed 2021 budget, the White House is cutting funding for the U.S. Centers for Disease Control and Prevention as well to other public health agencies, including the Health Resources and Services Administration and the Environmental Protection Agency.

While some states, including Massachusetts, are working on public health measures such as contact tracing, a plan for nationwide tracking has not been developed and may not even be possible now, given the more than 5.5 million confirmed cases in this country.

And testing, as it's currently conducted, often raises more questions than answers. Because of the fragmented and inconsistent way testing is being performed throughout the country, it's debatable how accurate the data are, especially without breakdowns by zip code and educational attainment as well as by age, race, and sex.

"We hear about how many tests are done in each state," says Martin. "But this number is virtually meaningless. You have the same total number if you test 20,000 rich white asymptomatic people or 20,000 low-income people who are sick and living in public housing or in prison. So it's difficult to drill down on who is really being harmed."

Still, says Alegria, "we don't need to wait for more data to tell us there are racial disparities" for this pandemic and that many disparities are driven by poverty.

Yet, Bassett points out that with COVID-19, as with diseases across the board, "not all of the racial difference in risk is explained by poverty." She notes that highly educated Black women have more adverse health

"Housing is health care. Being able to socially distance is really a privilege."



Bijiibaa´ Garrison

outcomes in general than high-school educated white women, for example, and that babies born to college-educated Black women are more likely to have lower birth weights than those born to white women who dropped out of high school.

"Both of my daughters had low birth weights," she says. "The stresses of living in a world where you are continually demeaned in small ways and large has an effect on the body. That is part of the experience."

Blackstock says these injustices can actually affect someone's DNA. "The chronic and acute stress of historical trauma gets passed down not just orally but physically, through epigenetic inheritance," she says. "And that historical trauma bears at least some responsibility for underlying conditions like diabetes, high blood pressure, and heart disease."

Harsh season

It's not just Black and Latinx people who are being disproportionately affected by the pandemic or historically targeted by systemic racism. Indigenous communities have been devastated by the new coronavirus.

"Probably every single Navajo person, regardless of where they are in the world, has been impacted by it," says Bijiibaa´ Garrison, MD '12, a physician at the Alaska Native Medical Center in Anchorage, Alaska, who spent months volunteering in Navajo Nation. "The degree of loss is pretty profound."

To date, Alaska Native tribes have been more or less spared the effects of the pandemic because of strict early quarantining and a robust tribal health care system, but it's a different story in the Lower 48, particularly out west.

"American Indians on the East Coast are typically more dispersed and more urban," says Thomas Sequist, MD '99, an HMS professor of medicine and health care policy and chief patient experience and equity officer at Mass General Brigham. "But west of the Mississippi, a larger percentage of people live on reservations and are getting health care through the Indian Health Service." IHS has always been significantly underfunded, spending about $4,000 per capita in 2017—about 40 percent of the U.S. national per capita expenditure.

SHUTTERSTOCK

In addition, it took five weeks and a lawsuit before funds from the Coronavirus Aid, Relief, and Economic Security Act were made available to Navajo Nation and ten other federally recognized tribes. The tribes moved to sue when the U.S. Treasury missed the deadline for distributing the $8 billion appropriation, forcing the tribes to use their limited resources to fight the spread of SARS-CoV-2 among their citizens.

But other, more fundamental, factors complicate the picture and require longer-term solutions. "It was just bad luck that the virus got a foothold in Navajo Nation," says Sequist, a member of New Mexico's Taos Pueblo tribe. "But once it did, it took off wildly and spread without control because of social constructs like housing and economic disparities."

Conditions in Navajo Nation have long been compared to those of developing countries, with more than a quarter of households lacking electricity and a third without running water, which makes frequent handwashing to prevent infection impossible. Broadband internet services and cell towers are also scarce, curtailing access to public health messaging and telehealth consultations that could not only assess physical illnesses but also help address mental health issues heightened by isolation and grief.

As it is with other rural populations, the medical framework among Indigenous people is "lean and marginal," says Martin. Rural areas have fewer ventilators and fewer hospital beds, he notes, so patients often have to be transferred to nearby cities for treatment, which is difficult when those areas are experiencing their own surge of cases. By early July of this year, the number of positive COVID-19 tests had spiked by 20 percent in New Mexico; neighboring Arizona saw hospitalizations increase by 35 percent in June. "We may have no choice but to start taking care of critically ill patients on the reservation," says Garrison, who worked in Shiprock, New Mexico, a town with a single, 55-bed hospital.

As in all rural areas, there's also a shortage of health care workers, from doctors and nurses to radiologists and phlebotomists, in and around Navajo Nation. The solution, Garrison and Sequist agree, is obvious. "It's very clear that once Native people become physicians, they are more likely to work in the IHS," says Sequist. "The push should be to get more Native people into medical school rather than to try to pay doctors to go to reservations."

This would also make public health efforts more effective and increase trust in the health care system, adds Garrison. "It's always better to get care from someone who looks like you and is from your local area," she says.

Garrison has acted on this fact. After completing her volunteer work in New Mexico and returning to Alaska, she made a decision. "I am moving home," she says, "to work full-time as a general surgeon in Shiprock at the Northern Navajo Medical Center, the IHS hospital where I volunteered. It's so important to have medical providers from the community and the same culture."

This type of intellectual investment helps increase economic self-sufficiency, which both physicians argue is the only way to truly move forward. "If 40 percent of a population is unemployed, you can't have health in that setting," says Sequist. "By definition there will be high levels of social risk factors like homelessness and food scarcity, and with that comes mental illness. Not long after that is the development of chronic illnesses—diabetes, cardiovascular disease, undiagnosed cancer—all of which contribute to poor health outcomes.

"We need to face the fact that this population has such large inequities because the federal government has created a system where economic prosperity cannot survive. It's how the system's been designed."

Weather change

There are good reasons to fix the system. Aside from the moral argument that racism is wrong, says Richardson, "when you have a population that's at high risk for disease, whether it's HIV or COVID, a lot of the transmission through the general population is determined by the transmission rates in the highest-risk group."

Simply put, "a highly contagious virus makes it clear that it's pretty difficult to be safe in your bubble no matter how wealthy you are," says Bassett. "Helping vulnerable groups is absolutely foundational. It's the platform on which all levels of society rest."

It took five weeks and a lawsuit before funds from the Coronavirus Aid, Relief, and Economic Security Act were made available to Navajo Nation and ten other federally recognized tribes.

For a healthy society, experts agree, everyone needs better access to quality education and to economic security. People need living wages and health care that's not linked to employment. They need better representation in the U.S. government and policy changes on a variety of issues. And finally, the wealth gap between white people and people of color in the United States needs to be closed. Many, including Richardson, say the only way to do that is through financial reparations, at least for Black people whose ancestors were brought to this country as slaves. "If reparations had been paid just five to ten years ago," says Richardson, "COVID-19 death rates between white and Black people would likely be near parity."

If the political will for reparations and other policy changes is ever mustered, they might go a long way toward rebuilding the skepticism marginalized communities have held for centuries, says Blackstock. "People talk about mistrust of medicine because of the Tuskegee experiment, the government-run operation in which Black men with syphilis had their diagnosis, treatment, and information about the long-term sequelae of the disease withheld—all without their knowledge."

"But a lot of people don't even know about Tuskegee," she points out. "It's the current realities that make people mistrustful. And that's pretty common among Black people across education and income levels."

Although the current moment has created turmoil in so many ways, there are a few lights flickering in the darkness. COVID-19 treatments are improving, and a vaccine appears to be imminent. But perhaps more important, the country seems to be approaching a tipping point in the quest for social justice, a change that would signal better, more healthy lives for everyone.

"We needed more awareness and activism around what is happening in this country in a big way," says Alegria. "That in itself has given me hope." HM

Elizabeth Gehrman is a Boston-based writer.

in 5

A conversation with Sloan Devlin, assistant professor in the Department of Biological Chemistry and Molecular Pharmacology in the Blavatnik Institute at HMS



You study bacteria involved in human health and disease. What is the ultimate goal of your research?

My lab is interested in learning all it can about the ability of bacteria to make amazing molecules. There are hundreds, if not thousands, of bacterial strains in each healthy human, and they vary from person to person. We think if we can understand the molecules that bacteria produce and what those molecules do, we can understand how these bacteria affect the progression of disease or help maintain human health. In doing so, we may discover new drug targets or even use some of these bacteria-made molecules as drugs to treat disease.

What ignited your interest in the human microbiome?

I am a chemist by training, and as the joke goes, you're either a chemist who likes to make drugs or a chemist who likes to blow things up. You're either more interested in biology or in the physical sciences. I was always the chemist who wanted to make drugs, and I wanted to do postdoctoral work in a field where chemistry met biology. During my postdoctoral work with my advisor Michael Fischbach at the University of California, San Francisco, I realized that we really knew almost nothing about the chemistry of the microbiome. I saw a big opportunity to contribute.

What is the most misunderstood aspect of microbiome research?

One big misunderstanding in the general public is the difference between correlation and causation. A headline might be "Microbiome causes Alzheimer's." But if you dig deeper, only an association, a correlation, was found. In my lab, and in others in the field, we are really trying to get to the causal relationships. It's much easier to find correlations but much harder to go the next step and look for actual causation in what bacteria are doing.

You were a champion sailor as an undergrad. Are there parallels between sailing and the process of discovery?

Absolutely! From ages 6 to 21, when I began to focus on science, I sailed more than I did anything else. I think about the parallels a lot. There is a saying that success happens when preparation meets opportunity. It is true in sailing and science. You have to be prepared and take the opportunities when they arise. Both sailing and science also take a long time. Regattas can last a week at a time. You're out on the water all day, feeling the conditions, and racing all day. The same constant dedication over time in the lab happens in science and discovery.

Which famous figure (dead or alive) would you want to have coffee with?

I think I would pick a female trailblazer. I think Lindsey Vonn would be my choice. She's roughly my age, and she's the winningest female skier of all time. But she's also had a number of crashes and surgeries she's had to overcome. One of the ways that she was able to break free and win so much is she started skiing on men's skis. Everyone said she couldn't do it, that she was going to hurt herself. She proved everybody wrong. She started this movement of women skiing on men's skis.

—Ekaterina Pesheva



Aaron Cheng celebrates his residency in internal medicine at Massachusetts General Hospital.

Match List 2020



Jeffrey Herrala (left) and Allison Merz (lower right) enjoy news of their couples match while with family members. Herrala's residency in emergency medicine will be at the Alameda Health System-Highland Hospital and Merz's in obstetrics and gynecology will take place at the University of California San Francisco.

ANESTHESIOLOGY

Sarah Osmulski
Brigham and Women's Hospital

Gavin Ovsak
Brigham and Women's Hospital

Christopher Richey
Brigham and Women's Hospital

Jocelyn Streid
Brigham and Women's Hospital

DERMATOLOGY

Fiatsogbe Dzuali
University of California San Francisco

Andrea Hinton
Stanford University

Edward Binghang Li
Northwestern University McGaw Medical Center

Gabriel Molina
Stanford University

Kira Seiger
University of California San Francisco

EMERGENCY MEDICINE

Alex Bonilla
Icahn School of Medicine at Mount Sinai

Sean Singer
Massachusetts General Hospital

Joe Tung
University of Pittsburgh Medical Center

Connie Zhong
Massachusetts General Hospital

Jeffrey Herrala
Alameda Health System-Highland Hospital

Inkyu Kim
Massachusetts General Hospital

Christopher Murray
Massachusetts General Hospital

Gregory Peters
Massachusetts General Hospital

Justin Rice
New York University Grossman School of Medicine

Kirstin Scott
University of Michigan Hospital

FAMILY MEDICINE

Andrew Foley
Lancaster General Hospital

Rebecca Hofer
University of California San Francisco

GENERAL SURGERY

Isaac Alty
Brigham and Women's Hospital

Matthew Basilico
Johns Hopkins Hospital

Bennet Cho
Massachusetts General Hospital

Colin Fadzen
Johns Hopkins Hospital

Yun Jee Kang
Brigham and Women's Hospital

Michael Kochis
Massachusetts General Hospital

Selena Li
Massachusetts General Hospital

Alexander Ordoobadi
Brigham and Women's Hospital

Eve Roth
Beth Israel Deaconess Medical Center

Neha Shafique
Hospital of the University of Pennsylvania

Kailan Sierra-Davidson
Massachusetts General Hospital

Matthew Weber
Massachusetts General Hospital

INTERNAL MEDICINE

Matthew Alkaitis
Stanford University

Todd Brenner
Johns Hopkins Hospital

Bliss Chang
New York-Presbyterian Hospital/Columbia University Medical Center

Aaron Cheng
Massachusetts General Hospital

David Clossey
Brigham and Women's Hospital

Pedro Cortes
Mayo Clinic School of Graduate Medical Education

David Cox
Stanford University

Ricardo De Armas
Brigham and Women's Hospital

Bhushan Deshpande
University of Michigan Hospital

Chuqiao Dong
Beth Israel Deaconess Medical Center

Sienna Durbin
Massachusetts General Hospital

Connor Emdin
Massachusetts General Hospital

Emma Fink
Brigham and Women's Hospital

Emily Gutowski
Icahn School of Medicine at Mount Sinai

Jennifer Halford
Massachusetts General Hospital

Austin Herbst
Beth Israel Deaconess Medical Center

Eran Hodis
Brigham and Women's Hospital

Felicia Hsu
UCLA Medical Center

Julia Hyman
University of Massachusetts Medical School

Tara Jain
Brigham and Women's Hospital

Min Young Jang
Brigham and Women's Hospital

Mugdha Joshi
Stanford University

Ruth Kagan
New York-Presbyterian Hospital/Weill Cornell Medical Center

Ethan Katznelson
Brigham and Women's Hospital

Patrick Lee
Cedars-Sinai Medical Center

Donna Leet
University of California San Francisco

Andrew Maul
Johns Hopkins Hospital

Kristen Mengwasser
Brigham and Women's Hospital

Shirley Mo
University of California San Francisco

Andrew Nguyen
Stanford University

Peiyun Ni
Massachusetts General Hospital

Coyin Oh
University of California San Francisco

Yakir Reshef
Brigham and Women's Hospital

Daniel Sikavi
Massachusetts General Hospital

Andrew Song
Massachusetts General Hospital

Constantine Tarabanis
New York University Grossman School of Medicine

Martin Ventoso
New York-Presbyterian Hospital/Columbia University Medical Center

Pedro Vera Gonzalez
Northwestern University McGaw Medical Center

Christine Wang
Brigham and Women's Hospital

Edward Wang
University of California San Diego Medical Center

MEDICINE-PRIMARY

George Agyapong
Yale-New Haven Hospital

Khin-Kyemon Aung
Brigham and Women's Hospital

Josephine Fisher
Massachusetts General Hospital

Jonathan Fried
Brigham and Women's Hospital

Michael Girouard
University of California San Francisco

Micah Johnson
Brigham and Women's Hospital

George Karandinos
Massachusetts General Hospital

Sophia Meyerson
New York University Grossman School of Medicine

Lauren Mitchell
New York-Presbyterian Hospital/Weill Cornell Medical Center

Alexis Peterson
Rhode Island Hospital/Brown University

Samantha Sanders
New York University Grossman School of Medicine

Lisa Simon
Brigham and Women's Hospital

NEUROLOGICAL SURGERY

Malia McAvoy
University of Washington Affiliated Hospital

Clara Starkweather
University of California San Francisco

NEUROLOGY

Nicholas Bodnar
Brigham and Women's Hospital

Ling-Ya Chao
University of California San Francisco

Emma Meyers
Brigham and Women's Hospital

Rachel Rodin
Brigham and Women's Hospital

Kevin Sikah
Beth Israel Deaconess Medical Center

OBSTETRICS AND GYNECOLOGY

Danika Barry
Northwestern University McGaw Medical Center

Michelle Bayefsky
New York University Grossman School of Medicine



COURTESY OF GRACE LEE

Grace Lee (above left) shares news of her residency in radiation oncology at Massachusetts General Hospital with her sister and, via a video call, their family in South Korea.

Parisa Fallah
Brigham and Women's Hospital

Elizabeth Lemoine
University of North Carolina Hospitals

Elizabeth Maxwell
Brigham and Women's Hospital

Sloane Mebane
Duke University Medical Center

Allison Merz
University of California San Francisco

Tiffany Minors
Beth Israel Deaconess Medical Center

Blanca Morales Temich
University of California San Francisco

Simone Sasse
New York University Grossman School of Medicine

Nora Torres Yordan
University of Chicago Medical Center

Samantha Truong
Brigham and Women's Hospital

OPHTHALMOLOGY

Shaunak Bakshi
University of Southern California Roski Eye Institute

Theodore Bowe
Wills Eye Residency Program at Jefferson

Sarah Garnai
University of Michigan Hospital

Janice Kim
Columbia University Harkness Eye Institute

Maltish Lorenzo
University of California Los Angeles

Yifan Lu
Massachusetts Eye and Ear

Talia Shoshany
Wills Eye Hospital

Thuzar Thein
Yale-New Haven Hospital

Carlos Torres Quinones
Oregon Health and Science University

Sean Wang
Stanford University

ORAL AND MAXILLOFACIAL SURGERY

Daniel Caruso
State University of New York at Buffalo

Karan Ganjawalla
Massachusetts General Hospital

Min Kyoung Kim
Massachusetts General Hospital

ORTHOPEDIC SURGERY

Ameen Barghi
Wake Forest Baptist Medical Center

George Bugarinovic
Stanford University

Tyler Chavez
University of New Mexico School of Medicine

Damari Croswell
University of California Irvine Medical Center

Jonathon Florance
Duke University Medical Center

Carew Giberson-Chen
Massachusetts General Hospital

Jennifer Kallini
UCLA Medical Center

Aditya Karhade
Massachusetts General Hospital

Jordan Lebovic
New York University Grossman School of Medicine

Jacob Silver
University of Connecticut School of Medicine

Richard Smith
Massachusetts General Hospital

Jason Young
Massachusetts General Hospital

OTOLARYNGOLOGY

Zoe Fullerton
Stanford University

Institutions listed represent only categorical residency matches and their locations.

Michael Lindeborg
University of California San Francisco

Anahita Nourmahnad
University of Miami/Jackson Health System

Oghenefejiro Okifo
Henry Ford Hospital

PATHOLOGY

Jun Liu
Brigham and Women's Hospital

Daniel Pearson
Massachusetts General Hospital

PEDIATRICS

Pamela Chen
Boston Children's Hospital

Hilary Dolstad
Brigham and Women's Hospital

Swati Goel
Hospital of the University of Pennsylvania

Amy Li
Boston Children's Hospital

Julia Pian
Boston Children's Hospital

PEDIATRICS-COMMUNITY HEALTH

Hemen Muleta
Children's National Medical Center, Washington, DC

Lucila Suarez
Children's National Medical Center, Washington, DC

PLASTIC SURGERY

Ricardo Ortiz
Brigham and Women's Hospital

PSYCHIATRY

Matthew Baum
Brigham and Women's Hospital

Sarah Berman
Cambridge Health Alliance

Michael Dinh
University of California San Francisco

Benjamin Kovachy
Stanford University

David Liebers
New York University Grossman School of Medicine

Joseph Pereira
New York-Presbyterian Hospital/Columbia University Medical Center

Johnathan Sataloff
Beth Israel Deaconess Medical Center

Elizabeth Steuber
Johns Hopkins Hospital

Michael Tom
Beth Israel Deaconess Medical Center

Sandhira Wijayaratne
Yale-New Haven Hospital

RADIATION ONCOLOGY

Santino Butler
Stanford University

Jie Chen
University of California San Francisco

Michael Dykstra
University of Michigan Hospital

Grace Lee
Massachusetts General Hospital

Elie Mehanna
Massachusetts General Hospital

Sana Raoof
Memorial Sloan-Kettering

RADIOLOGY

Camilo Campo
University of California San Francisco

Scott Goodwin
Duke University Medical Center

Jesi Kim
New York University Grossman School of Medicine

Damir Ljuboja
University of Texas Medical School

Max Wallack
Massachusetts General Hospital

THORACIC SURGERY

Perry Choi
Stanford University

UROLOGY

Yefri Baez
Brigham and Women's Hospital

Emily Ji
Northwestern University Feinberg School of Medicine

VASCULAR SURGERY

Jayne Rice
Hospital of the University of Pennsylvania

OTHER

Seth Cassel
U.S. Senate

Tyler Hayes
Boston Consulting Group

Dayton McMillan
Boxer Capital

Claire Wagner
Bill & Melinda Gates Medical Research Institute

Topical **Interest**

THE ALLURE OF IMMUNOLOGY WAS STRONG. So strong that Adewole Adamson took a year off from medical school for a clinical research training program at the National Institutes of Health.

"It was there that I received a scientific introduction to the skin, this huge immunologic organ," he says. He would later specialize in dermatology.

Curiosity about how things work has been an abiding interest for Adamson. A high-school program introduced him to lab-based science; the program's director gave him the confidence to believe he could be a researcher.

"It was really special to have somebody in my corner who saw something in me that maybe others didn't," says Adamson. "Maybe it was because she was a Black woman. I give her a lot of credit for starting me down this road."

Now, Adamson works to reveal bias in some of his specialty's diagnostic tools and to educate his peers and the public on misconceptions about skin diseases. An area of focus is the detection of skin cancers, particularly melanoma, using artificial intelligence.

Research has revealed that algorithmic bias limits these tools. In dermatology, an algorithm must "learn" to recognize pathology on multiple skin colors and types, otherwise some conditions could be missed or misdiagnosed, often with potentially severe consequences.

Adamson also has challenged the clinical dogma that people with dark skin should use sunscreen to prevent melanoma. The evidence, according to statements he made in *The Washington Post* and *The New York Times*, is simply not there.

"People haven't stepped back and asked whether it makes sense that UV exposure is related to melanoma in people who identify as Black," he says. Skin cancers in dark-skinned people, he notes, are more often found on the soles of the feet or palms of the hands, areas that don't receive much sun exposure.

He remains grateful for the people he met at HMS, recalling "the astute eye for diagnosis" of Harley Haynes, MD '63, an HMS professor of dermatology at Brigham and Women's Hospital.

"But for me the most remarkable part about being at HMS was my classmates. I was in the London Society, which was a very close-knit group, with only thirty of us. I remain friends with many of those folks, and it's been amazing seeing them blossom."

For now, Adamson is enjoying his work and learning from his peers and patients. Health care is his first love, and the future might see him augmenting his health care practice with public policy.

And if that doesn't work out, he has a backup plan: becoming a "high-end mixologist," he quips. Through self-training he has become adept at making cocktails and practices on friends. Something you can't do as a physician.

—Susan Karcz



Adewole Adamson, MD '11 | assistant professor of internal medicine, Division of Dermatology, Dell Medical School | director, Pigmented Lesion Clinic, University of Texas at Austin



Tiara Lacey

TIARA LACEY HAD HER LIFE PLANNED OUT earlier than most. "A scholarship essay I filled out as a junior in high school asked about my long-term goals," she says. "I put down that I was going to go to Spelman College and then get a PhD from Harvard."

It never occurred to Lacey to question whether she could do it. "I really broke my neck in high school and knew I would do the same thing in college," she says. She worked full-time as a researcher, was involved in student government, took on service projects with her sorority, and did four summer programs.

She had a head start on achievement. Her father, a real estate agent in a suburb of Columbia, Maryland, "gives 110 percent to everything," she says, and always encouraged her and her sister, a law school graduate, to do the same. Their mother, an engineer, was similarly driven, but was diagnosed with breast cancer when Lacey was 10 and died three years later. "I dealt with the loss by getting overinvolved at school," Lacey says. "That was the coping mechanism of choice."

Coming from a historically Black women's college to a predominantly white co-ed institution was a "major leap," both in terms of having to combat her tendency toward timidity in classes with men and needing to become comfortable in a cohort of fifty that had only seven students from underrepresented populations. "The increased visibility, and going through a bit of an impostor experience, were an adjustment for me," she says.

Those challenges overcome, she now mentors young scholars in the Summer Honors Undergraduate Research Program (SHURP) at HMS and has taken on a leadership role in campus empowerment and social justice initiatives. "Just being the only minority face in the room isn't enough," she says. "I want to make sure I'm not the only one. To lift as I climb."

Surprisingly, her future is less certain than it seemed to her teenage self. "The downside of working so hard is that you miss cookouts, graduation parties, birthdays," she says.

As a PhD candidate in the Harvard Biological and Biomedical Sciences Program, Lacey is part of the laboratory of HMS neuroscientist Corey Harwell, where the research team studies how neurodevelopmental history shapes adult function. Lacey's work focuses on the developmental regulation of a particular type of neuronal signaling, research that may provide further insight into how the brain adapts to new information and influences behavior.

Although Lacey hasn't ruled out staying in academia, she's also interested in policy, industry, and consulting on biotech issues. "All options are open," she says.

—Elizabeth Gehrman

HARVARD
MEDICAL SCHOOL

Join us in our work to alleviate
suffering and improve health
and well-being for all

HMS.HARVARD.EDU/HM-GIFT

PLEASE
PLACE
STAMP
HERE

HARVARD MEDICAL SCHOOL
ALUMNI AFFAIRS AND DEVELOPMENT

P.O. BOX 419720
BOSTON, MA 02241-9720

HARVARD
MEDICAL SCHOOL

TO GIVE

ONLINE at hms.harvard.edu/hm-gift
PHONE 617.384.8626 or 800.922.1782
CHECK *(payable to Harvard Medical School)*
CREDIT CARD *(details below)*
JOIN THE DEAN'S COUNCIL
with an annual gift of $2,000 or more*

ENCLOSED IS MY GIFT TO HARVARD MEDICAL SCHOOL OF:

☐ $2,000 ☐ $1,000 ☐ $500 ☐ $100 ☐ OTHER _____

DONOR NAME *MR. MRS. MS. DR.* _____ _____
CLASS YEAR *(if applicable)*

ADDRESS

CITY, STATE, ZIP

_____ _____
DAY PHONE EMAIL

THIS IS A: *(check if applicable)*

☐ JOINT GIFT _____
SPOUSE/PARTNER

☐ MATCHING GIFT
MY COMPANY (OR SPOUSE/PARTNER'S COMPANY) WILL MATCH MY GIFT. I HAVE NOTIFIED THE COMPANY OF MY GIFT TO HMS.

PLEASE DESIGNATE MY GIFT TO:

☐ **Where it is needed most**
☐ Therapeutic innovation
☐ Campus revitalization
☐ Cutting-edge research
☐ Financial aid and education
☐ Diversity and community
☐ Global health and service
☐ Other _____

CREDIT CARD GIFTS:
To make a gift by credit card, please do so **ONLINE** at **HMS.HARVARD.EDU/HM-GIFT**

MONTHLY RECURRING GIFTS AND PLEDGES:
To make a monthly recurring gift or a pledge payable over multiple years, please call 617-384-8626 to learn more.

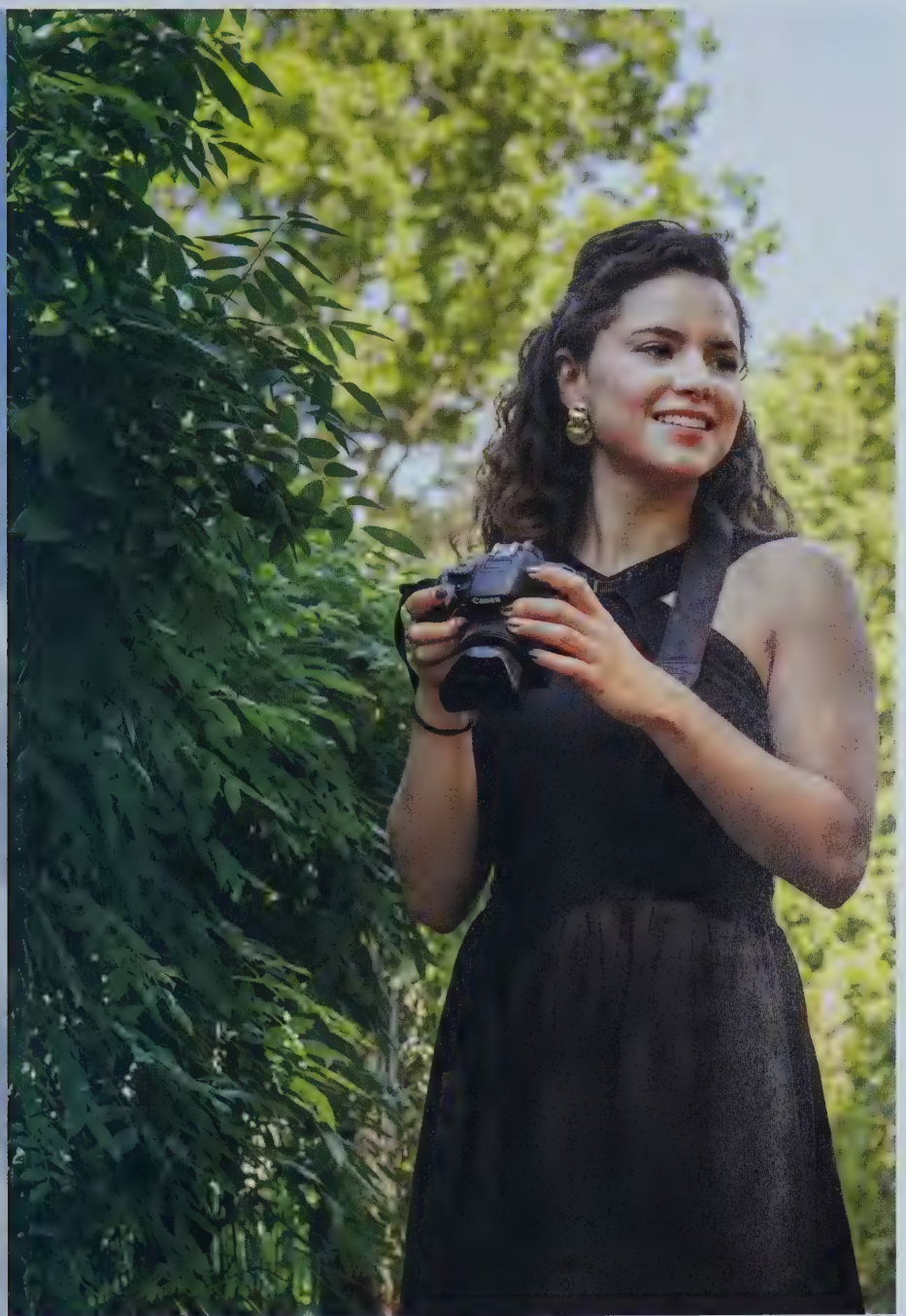
PLEASE CONTACT ME ABOUT:

☐ Naming a chair in the Joseph B. Martin Conference Center Amphitheater
☐ Exploring naming opportunities with a gift of $25,000 or more
☐ Leaving a gift to HMS through our will, retirement plan, or donor-advised fund

M2124

** Recent grads can join the Dean's Council with annual gifts totaling $250 (1–4 years out from graduation), $500 (5–9 years out), or $1,000 (10–14 years out).*

DO NOT WRITE BELOW THIS LINE



Isle Bastille

ISLE BASTILLE'S CHILDHOOD was unlike those of most of her Harvard peers in several ways, but one in particular stands out: "My parents were never really the type to focus on school," she says. "My dad's catchphrase was, 'You don't have to go if you don't feel like going.'"

Bastille was born in Guadalajara, Mexico, where her parents met while teaching at the American School Foundation, a nonprofit education organization based in Mexico. Eventually settling in Barnstable, Massachusetts, where her father had grown up, her parents divorced when Bastille was 6, but remained united on parenting philosophies. "They were very anti-television, and one of their biggest things was that you weren't allowed inside if it was nice out. So the majority of the time I was outside or reading."

As a child, Bastille often conducted her own mini science experiments, although she didn't define them that way at the time. She installed several ant colonies in her bedroom—"much to my mother's dismay"—so that she could observe the insects' behaviors, and she frequently deployed acorns in the family's backyard in her quest to observe squirrel behavior. (Results, she admits, were often inconclusive.)

Her dreams of college were tempered by financial concerns, but she received a generous financial aid package from Cornell University and planned a career as a veterinarian until she "got swept away by how interesting neuroscience was." While she considers herself a cellular biologist at heart, "the nervous system has some of the coolest, most exquisitely optimized cells in the body." And today, as a graduate student in the Program in Neuroscience working in the lab of HMS neuroscientist Lisa Goodrich, Bastille investigates how neurons in the ear capture auditory stimuli and accurately transmit that information to the brain.

Bastille says her experiences at HMS have opened up new worlds to her. In her first year, she got to work with "fancy" electron microscopes, which made a deep impression.

"I was looking at thinly sliced sections of spinal cord tissue and could see the subcellular organelles within all the cells," she says. "That was just a total blast to me."

Bastille tries to be "intentional" in maintaining her cultural identity. In her work in mentorship programs such as the School's Summer Honors Undergraduate Research Program (SHURP) and the Health Professions Recruitment and Exposure Program, Bastille has "heard from these brilliant young women that they've never seen someone like me being a scientist." She adds, "I just recently realized I've personally never met a Latina principal investigator."

Might she someday be a Latina PI? "I never take for granted anything I have," she says. "I'm just like, 'Wow, let's see where this goes!'" —*Elizabeth Gehrman*



Ayana Henderson

AS THE OLDEST OF FIVE CHILDREN, Ayana Henderson sees herself as a role model. "I want my younger siblings to know the possibilities are limitless and whatever their passion is, they should go for it without fear of failure," she says. Henderson knows how such support can shape young lives. Her mother and especially her grandmother, who helped raise her, were "very nurturing spirits."

Being deeply nurturing and empathic can prove to be too much of a good thing, however. "I wanted to be a physician," says the doctoral candidate. "I started shadowing my pediatrician to learn about it but quickly realized I couldn't handle the emotional burden of direct patient interaction."

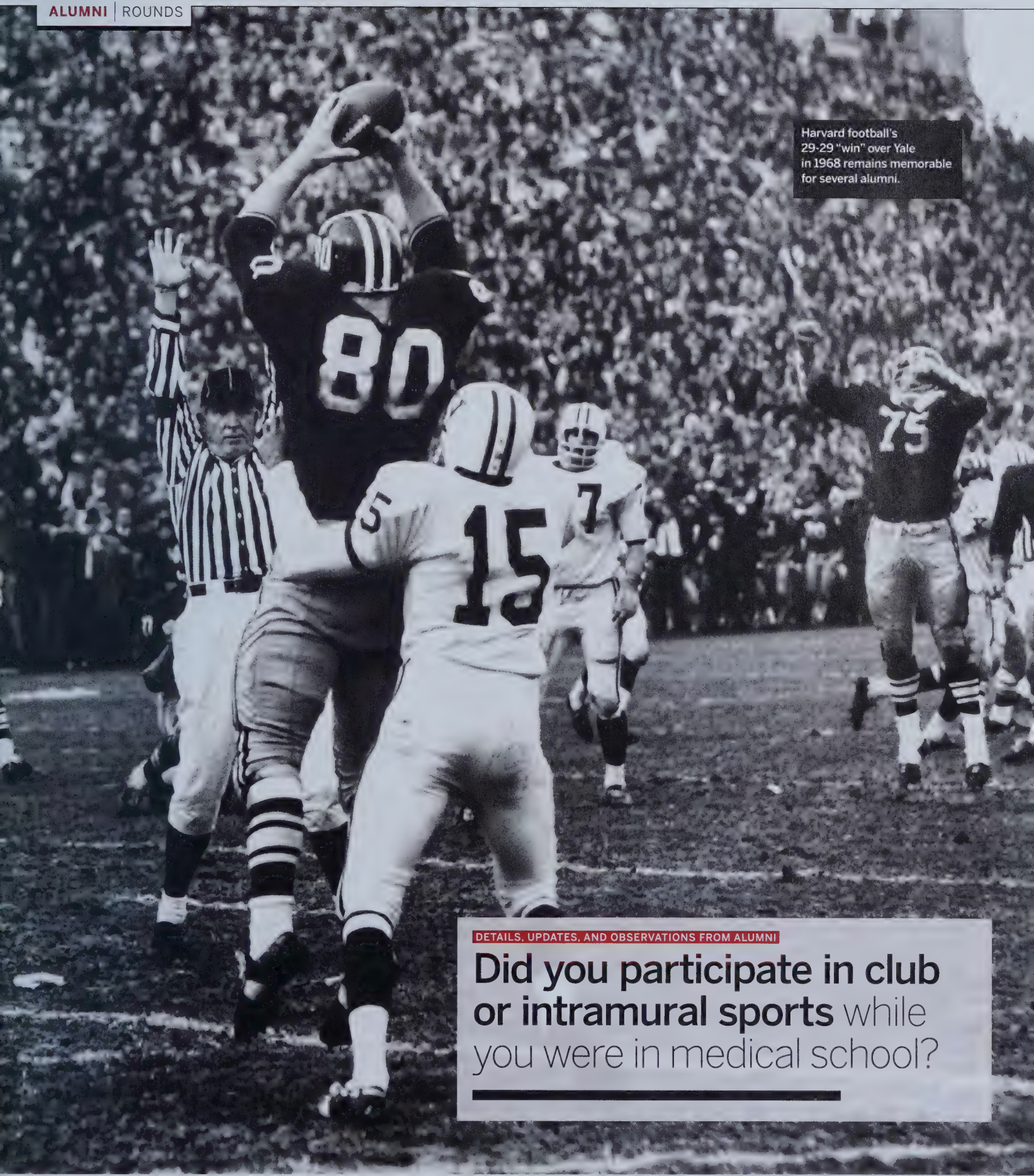
It took a while for her to come to terms with not being able to compartmentalize her compassion enough for clinical practice. Even when, as an undergraduate, she became aware of research as a career path, she remained committed to combining her PhD with an MD. "My family's advice had always been 'you should be a doctor,'" she says. "Many Black families have a limited view of what a scientist looks like because very few people in science look like us."

A gap year spent in the Research Scholar Initiative postbaccalaureate program in Harvard's Graduate School of Arts and Sciences showed her that she could help people—and be happier—by studying the molecular mechanisms that underlie disease, particularly diseases that disproportionately affect women and minorities. She is now a PhD candidate in Harvard's Biological and Biomedical Sciences Program, working in the laboratory of HMS geneticist Monica Colaiácovo.

Harvard was "never a place where I could see myself," Henderson admits, but once she was accepted, she found a community among the Minority Biomedical Scientists of Harvard, which made her realize "I will be supported here." More recently, activism against racism has given her hope that this moment of cultural change will ultimately show young people like her siblings that there is a place for them in academia and especially in STEM fields.

"My immediate reaction to the deaths of George Floyd and Breonna Taylor, among so many others, was sadness and hopelessness," she says. "But having a team of people beside you who are so passionate makes you want to continue to fight. Whatever my career is to be I know it will include science outreach and mentoring of underrepresented kids. I really love children and hope to inspire and expose them to science as early in their lives as possible."

—Elizabeth Gehrman



Harvard football's 29-29 "win" over Yale in 1968 remains memorable for several alumni.

DETAILS, UPDATES, AND OBSERVATIONS FROM ALUMNI

Did you participate in club or intramural sports while you were in medical school?



Paul H. Altrocchi, MD '57

A few weeks after the HMS Class of 1956 started med school in the fall of 1952, **Bill Green, MD '54,** put a notice on Vanderbilt Hall's bulletin board. He was organizing an HMS basketball team and said that a practice would be held one week hence in the gym on Monday. The first game was scheduled for Wednesday against a very good Reynolds Club semipro team from Boston.

On Saturday, the Reynolds Club played against the Harlem Globetrotters at Boston Garden prior to the Celtics game. With five minutes to go, Reynolds was ahead by six points and was determined to win. The Globetrotters quickly dropped their entertainment routine, got serious, and barely managed to eke out a two-point victory. Some of us read about the game in the Sunday *Boston Globe*.

On Monday night, four '55ers and four '56ers showed up for Coach Green's practice, only three of whom had been on varsity basketball teams in college, including two '55ers, **Quent Stiles** from Harvard and **Roman DeSanctis** from some college west of the Charles River. Most of the group hadn't played ball since high school. The practice was characterized by optimal enthusiasm but suboptimal expertise. A Brigham nurse observing the practice predicted a score of 56 to 2.

Much to our own surprise, and certainly to that of the very serious and aggressive Reynolds Club, we had one of those nights when we played extremely well together, shot 65 percent from the field, led the entire game, and humiliated the cocky semipros 44 to 34.

For many weeks the Reynolds Club demanded a rematch, but we unanimously chose to keep intact our unblemished, undefeated season.

Peter M. Zawadsky Jr., MD '68

On weekend evenings about twelve of us second-year students would regularly play volleyball in the Vanderbilt Hall gym. Classmate **Kenneth Prager** and I played squash together often in the Vanderbilt Hall squash court.

Onesmo K. ole-MoiYoi, MD '72

I did long-distance running with "The Jocks of Aesculapius."

Helen Yu, MD '15

I joined the fencing club over at the Cambridge campus. I fenced in college, so it was great to be able to continue doing that in medical school.

Paul Wheeler, MD '61

No time for sports in med school, but later did road-jogging and stair-climbing in a 17-story hospital building at Hopkins for fitness. In retirement, I enjoy golf. Initially my game was "hit and run," later "hit and jog," followed by "hit and waddle." Now it's mainly "hit and walk," but still with bag in hand at 84.

Luis Fernandez-Herlihy, MD '49

I often played squash in Vanderbilt with friends.

"My fave was pitcher Luis Tiant, and I got to meet him five years ago at a World Series game."



The squash court in Vanderbilt Hall (far left) has long been a popular source of recreation for HMS students while others enjoy intramural competition, such as the hockey matches that feature HMS students like Michael Seward (near left) skating for the School against peers in Harvard's schools of business or law.

Richard Peinert, MD '73

I would play touch football on the Quad two or three times a week in the fall. It was a multiclass effort and we had a bunch, myself included, who had played football in college. Great fun. A couple were veterans of the great Harvard 29-29 "win" over Yale in 1968.

We also had a softball team made up of folks from several classes. Best hands belonged to the late **Charlie Krauthammer, MD '75,** who played shortstop. He certainly led a life well-lived in spite of that dreadful accident.

Also attended a lot of Red Sox games during my first year. My fave was pitcher Luis Tiant, and I got to meet him five years ago at a World Series game.

Sina Saidi, MD '94

I organized an HMS soccer team that won the Harvard grad schools' intramural soccer tournament. Beating the Harvard Business School team in freezing cold weather at Soldiers Field was sweet. Proud to still have my team jerseys 25 years later.

Harold Sox, MD '66

Our class had a Division III All-American basketball player and several starters from college teams. We scrimmaged a lot in the Vanderbilt Hall gym. Our high point was a game against a team of Harvard law and/or business school students. I think we won.

Hena (Ahmed) Cheema, MD '18

Yes! I played recreational soccer weekly in first year and every month after that, except during the coldest parts of winter. I also did high-intensity interval training. It kept me happy, healthy, and grounded.

David Dorsky, MD '82 PhD '82

I wasn't aware of any clubs, but I played lots of squash and tennis and started running for exercise. Also, I joined Community Boating on the Charles and sometimes raced on Sundays.

Samuel Kim, MD '62

I played tennis, squash, basketball, softball, and Frisbee.

Daniel B. Hrdy, MD '76 PhD '84

The Vanderbilt Hall squash courts, five old-school wooden hardball courts, were charming and funky with great western windows. They were important to my HMS life. I organized several Vanderbilt squash tournaments there and, with classmates **Nils Daulaire, Doug Johnson,** and others, even entered a team in a Massachusetts Squash Racquets Association league several years, playing against clubs and schools from the entire Boston area. It was hard to maintain the roster, though, what with various schedule changes and medical emergencies.

Richard B. Dobrow, MD '62

Racquetball, with associated intramural matches.

Joseph McCabe, MD '74

I didn't participate in intramural sports, but I learned to ride a bicycle in medical school and started running regularly. I swam at the Mass Mental Health pool. I continue to commute much of the time on my bike, run regularly, participate in several 5K races each year, and occasionally swim.

Donald Dillon, MD '59

There were softball and basketball groups, but I did not participate. Work for pay occupied my extracurricular time. Also, I was a hospital lab tech many nights and weekends and then got married between second and third years.

John Merrifield, MD '59

Dave Rush and I played squash to exhaustion in the bowels of Vanderbilt Hall, away from the cares of the world, for happy times.

Dick Aadalen, MD '65

Basketball, squash, tennis, skiing. I participated in all of the above.

William Kupsky, MD '78

I ran around the Esplanade on my own and often walked between the Longwood Area and MGH but never participated in any organized sports—could never do anything involving projectiles!

Carolyn Aldredge, MD '63

During my student years, I only walked, but after finishing training, I have been involved in multiple sports, mostly individual, for conditioning, health, and stress management.

Bruce Barnett, MD '75

I do not recall participating in any organized sports groups, but I did enjoy competing on the squash courts at Vanderbilt Hall. I also jogged around the Fenway with medical school classmates, even in the winter months.

John Stanley, MD '58

None. Did not even go skiing—had no money or time for sports.

Joseph Burnett, MD '58

I swam once weekly at the Boston YMCA.

Mary Flowers, MD '78

Nah! I played tennis but at 70 years old eyes are now too bad. The balls kept hitting me in the face kinda like the changes in health care.

Joseph Barr, MD '60

Played squash, remember playing over at the law school.

Hugh Hermann, MD '54

I was involved in rowing.

Samuel Katz, MD '52

I knew of baseball and soccer teams and participated in intramural soccer.

Nathan Selden, MD '93

We played hoops at the public courts in the Fenway playground, sometimes just with my classmates, and sometimes with the neighborhood teenagers, which was a really nice intersection we all enjoyed.

Tamara Fountain, MD '88

Not formally. Played a few tennis matches on Vandy's "center court" and learned squash on the Vandy courts from a buddy.

Thanks to all who shared recollections of the role of sports during their time at HMS.

The next issue of Harvard Medicine *will carry your responses to the question:* ***How did receiving help with the costs of medical school assist you both while you were a student and afterward?***

Responses can be submitted online: ***hms.harvard.edu/rounds****; via email: hmsalum@hms.harvard.edu; by phone: 617-384-8520; or by mail: Rounds, Alumni Affairs and Development, Harvard Medical School, 401 Park Drive, Suite 505, Boston, MA 02215.*

Obituaries

1940s

1945

John A. Saylor, MD
April 12, 2020

1947

Paul W. Dale, MD
May 19, 2019

Paul D. Hoeprich, MD
September 16, 2004

Cheves M. Smythe, MD
May 11, 2020

1948

Arnold E. Botwin, MD
January 26, 2004

1950s

1951

Frederic C. McDuffie, MD
May 6, 2020

Norman E. Rubinstein, MD
February 1, 2020

1952

Ruth C. Haynes, MD
June 15, 2020

S. Louis Mogul, MD
May 10, 2020

William L. Morgan Jr., MD
April 21, 2020

1953

John B. Cadigan Jr., MD
May 14, 2020

John C. Herion, MD
March 31, 2015

1954

Donald L. Bornstein, MD
April 22, 2020

Richard Umansky, MD
July 14, 2020

Harold L. Upjohn, MD
March 24, 2020

1955

H. Arnold Muller, MD
April 29, 2020

1956

Raymond B. Hochman, MD
July 12, 2020

1957

David B. Harrod, MD
March 29, 2020

Abbott R. Miller, MD
April 30, 2019

1958

David E. Drum, MD
March 28, 2020

1959

Savelly B. Chirman, MD
May 9, 2020

1960s

1960

Eric L. Radin, MD
April 26, 2020

1962

Russell F. Doolittle, PhD
October 11, 2019

Peter B. Mansfield, MD
June 23, 2020

1963

Donald B. Roberts, MD
May 15, 2020

Robert E. Steele Jr., MD
April 19, 2019

Daniel Wigbold van Heeckeren, MD
June 9, 2020

1964

Bruce Ettinger, MD
June 15, 2019

William A. O'Neil, MD
June 14, 2020

1965

Ronald Brisman, MD
April 20, 2019

1969

Howard Snyder III, MD
June 4, 2020

1970s

1970

Joan H. Weens, MD
May 12, 2020

1974

William C. Scott II, MD
May 31, 2019

1975

Barbara A. Abercrombie, MD
April 1, 2019

1979

Debra Andrews, MD
May 27, 2019

1990s

1999

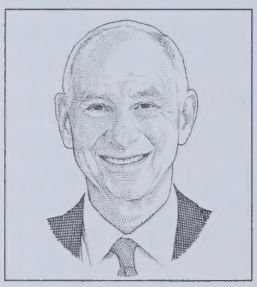
Kristen M. Upchurch, MD
May 29, 2020

This listing of deceased alumni includes those whose notices of death were received between May 1, 2020, and July 31, 2020.



PRESIDENT'S REPORT

Our **Strength and Purpose** During Trying Times



THESE ARE EXTRAORDINARY TIMES: a pandemic, a tide rising against racial injustice, a global economic crisis, and deep divisions in U.S. society. Many of our fellow alumni are helping to address the huge challenges before us. We are indeed grateful to those serving on the frontlines to combat COVID-19, develop vaccines and treatments, and improve access to health care. The Alumni Council is acting, too. It hopes to contribute by helping to create equal opportunity for students.

The Council held its first virtual meeting this spring. It was frustrating to not be able to say "good-bye" in person to Robert Barbieri, MD '77 (eighth pentad), Jacqueline Boehme, MD '16 (first pentad), Toren Finkel, MD '86 PhD '86 (seventh pentad), Lakshmi Halasyamani, MD '94 (councilor-at-large), and Jennifer Mack, MD '98 (fourth pentad)—all of whom ended three-year terms. I also thank fourth-year class co-presidents Troy Ameen and Vartan Pahalyants, who joined us this year as inaugural student representatives.

And I want to welcome our newly elected members: Kenneth Bridges, MD '76 (president-elect), Douglas Chin, MD '94 (councilor-at-large), David Cohen, MD '86 (seventh pentad), Margaret Liu, MD '81 (eighth pentad), Numa Pompilio Perez Jr., MD '15 (first pentad), and Coleen Sabatini, MD '04 (fourth pentad).

During our spring meeting, Dean George Q. Daley, MD '91, talked about the financial impact of COVID-19, including lost tuition revenue, increased financial need among MD students whose parents may become unemployed, and the diminished endowment. Following this news, the Council reexamined the wisdom of pursuing the goal of a debt-free MD education for students with financial need while also remaining sensitive to the changed financial circumstances for many alumni. After discussion, we reaffirmed the goal unanimously, and we confirmed the appetite among HMS alumni to help.

We have chosen to focus on financial aid for several reasons: 70 to 80 percent of students require some form of financial aid to attend medical school, young alumni accumulate interest on their debt during their training, and debt likely steers students away from primary care fields and public service. If there is one thing this pandemic has taught us, it is that society wants and needs doctors on the frontlines.

We also realize that although HMS has one of the most generous financial aid programs in the country, several top-tier medical schools are lowering student debt dramatically. We must remain competitive if we are to continue to attract the best students.

The Council will continue to work closely with Dean Daley and his team and with University leaders. Our aspirations may take time to be realized.

My thanks to all our alumni who are doing so much to make our world better, healthier, and more just. Please contact me at **hmsalum@hms.harvard.edu** with questions or comments.

Michael Rosenblatt, MD '73, is senior partner at Flagship Pioneering in Cambridge, Massachusetts.

Alumni Announcements

Join Your Reunion Committee

Classes ending in "1" or "6" are celebrating June 3–5. Join your reunion committee to help plan private class events and to encourage your classmates to participate in the 2021 activities. Contact the alumni engagement team at **hmsalum@hms.harvard.edu** or 617-384-8520 or for more information. We will continue to monitor the coronavirus pandemic, and although we hope we can celebrate in person next summer, the health, safety, and well-being of our community are our top priorities. We will regularly update information on reunion events at **alumni.hms.harvard.edu/reunion**.

Alumni Stories

We salute our alumni working on the frontlines or behind the scenes to combat COVID-19 and provide comfort during the pandemic. We are grateful for your efforts and are proud to highlight the power and impact of the HMS alumni community at **alumni.hms.harvard.edu/stories**.

Class Listservs

Connect with your HMS classmates through private class email discussion groups. All members of every class are automatically included on these digital forums using the email addresses on file with Harvard University. These email groups can be used to share personal news, to initiate conversations about health care, or to read discussions among classmates. To learn more, visit **alumni.hms.harvard.edu/connect**.

Thank You, Alumni Donors

Alumni gifts made during fiscal year 2020 are helping to sustain the HMS mission to improve health and well-being for all during these unprecedented times. Alumni giving not only supports core financial aid and research programs but also allows the School to support emerging needs, including COVID-19 response, diversity initiatives, and student emergency aid. View your class's honor roll of donors at **alumni.hms.harvard.edu/honor-roll**.

Harvard Alumni Directory

Are you interested in finding and networking with fellow Harvard alumni? Look no further than the Harvard Alumni Directory. Access to this directory and membership in the Harvard Alumni Association (HAA) are among the benefits you receive when graduating from HMS. To use the online directory to search by category, including by industry, region, specialty, and class year, visit **community.alumni.harvard.edu**.

FIXED INCOME | GIFT ANNUITIES

HARVARD MEDICAL SCHOOL

What will be your **Legacy?**



Lisa Mayer, EdM '81
Executive Director,
Giovanni Armenise-Harvard Foundation

Charitable Gift Annuities provide guaranteed, fixed income for life.

Lisa Mayer has worked at HMS for 20 years. Her deferred gift annuity establishes a teaching and research fund to support the HMS Family Van, a mobile health clinic. She will receive fixed income for life.

Join her in leaving a legacy at HMS.

Learn more at
hms.harvard.edu/income

Or contact us in confidence:
Kathleen K. Murphy at 1-800-922-1782

"I have worked for years with the faculty, students, staff, and researchers at Harvard Medical School and, as a result, I have confidence that my gift will be used to make a difference in the world."

HARVARD
MEDICAL SCHOOL

25 Shattuck Street
Boston, Massachusetts 02115

Electronic Service Requested

Nonprofit Organization

U.S. Postage PAID
Burlington, VT 05401
Permit No. 391



SHUTTERFREEK

The majesty of place

The community of Shiprock in Navajo Nation draws its name from the iconic Shiprock, the approximately 27 million-year-old monadnock in the high desert plain of Navajo Nation. During this pandemic, members of that Nation mounted a public health campaign to help stanch its high incidence of COVID-19 cases.